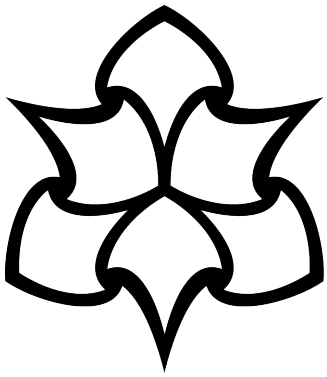

HUMAN-FOCUSED QUALITY MANAGEMENT (HFQM) FRAMEWORK TOWARDS PERFORMANCE EXCELLENCE FOR MALAYSIAN READY-TO-WEAR GARMENT INDUSTRY

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HUMAN-FOCUSED QUALITY MANAGEMENT (HFQM) FRAMEWORK TOWARDS PERFORMANCE EXCELLENCE FOR MALAYSIAN READY-TO-WEAR GARMENT INDUSTRY

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ABSTRACT

Quality remains as an essential attribute for the appraisal of manufactured products in today's contemporary fast-changing market. The world has witnessed how Quality Management (QM) concepts evolved from a specific departmental area of concern to a system-wide application of total quality or performance excellence. Many manufacturing-based organisations began to pursue the accreditation of international quality standards to be competitive in the global market. In relation to QM implementation, certification to ISO 9001 has been the most prevalent. However, after 30 years of its inception and global acceptation as a QM framework for product compliance, manufacturing companies still struggle to sustain their company's Quality Management System (QMS). Consequently, this scenario also has affected Ready-to-Wear (RTW) garment industry globally with the presence of Quality Control (QC) issues, involving the companies who manufacture the garments. The current literature reveals that the industry is still lacking knowledge on the fundamental aspects of quality and QM, hence leaving a big gap between the Quality Assurance (QA) systems and the actual QM implementation within the garment companies.

Malaysia represents one of the developing economies in the Southeast Asian Region who has a good reputation in supplying RTW apparel for both export and domestic market. Nevertheless, empirical evidence on how QM has been internalised by Malaysia RTW garment manufacturers has not yet been documented. This research examined the level of QM implementation in RTW garment industry and investigated the critical quality issues that hindered the deployment of Total Quality Management (TQM). The final aim of this research is to re-strategise the important QM principles as the core elements in developing a QM framework for an effective implementation of QM in the Malaysia context. The research utilised two sequential phases of data collection and analysis. The first phase of data collection was based primarily on the survey questionnaire to gain a general understanding of QM practices in the Malaysian RTW garment industry. Further investigation was carried out based on interviews mainly with the Head of Department (HOD) at six case-study companies, which represented the three types of Malaysian RTW apparel suppliers. Apart from face-to-face interviews, additional supplementary observations in the production floor as well as revision of documents were also used. The key findings of this research demonstrated that over-reliance to control system quality management is the ultimate reason for an ineffective QM implementation of Malaysian RTW garment manufacturers. Most of the case-study companies were found stagnant at QC and QA stages of QM implementation. Furthermore, the study also confirms the human factors were the main obstacles for the industry to fully adopt ISO-based Quality QMS. A Human-Focus Quality Management (HFQM) framework that gives priorities to the management and utilisation of people as valuable assets in the garment manufacturing sector are therefore developed and proposed. It was conceptualised from the ISO 9001 QM principles which focused on these three aspects: self-directed leadership, an involvement of people and internal customer focus.

The research has made a significant contribution to knowledge in expanding the theory of QM by highlighting the future of ISO 9001 QA System as part of company's international compliance. In addition, this research successfully developed HFQM framework as as a new contribution for Malaysian RTW apparel business towards the successful journey of performance excellence in a labour-intensive manufacturing environment. It is suggested that HFQM framework would bring fundamental changes towards sustaining the quality culture in the Malaysian RTW garment industry. Similar framework could possibly proposed and adopted in other labour-manufacturing companies as a strategy to foster people's engagement for continual improvement.

PUBLICATION

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DECLARATION

I declare that this thesis is all my own work and has not been copied from any other sources or accepted for any other Degree in any University. To the best of my knowledge this thesis contains no material written or distributed previously by any other parties, apart from where I have otherwise stated.

Nor Juliana Mohd Yusof

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LIST OF ABBREVIATIONS

ASEAN : Association of Southeast Asian Nations

AQL : Acceptable Quality Limit

BSCI : Business Social Compliance Initiative

HOD : Head of Department

HR : Human Resources

ISO : International Organisation for Standardisation

KPI : Key Performance Indicator

MTM : Made-to-Measure

MATRADE : Malaysia External Trade Development Corporation

MeCD : Ministry of Entrepreneur and Co-operative Development

MFA : Multi-Fibre Arrangements

MIDA **:** Malaysian Investment Development Authority

MITI **:** Ministry of International Trade and Industry

MKMA **:** Malaysia Knitting Manufacturers Association

MPC : Malaysia Productivity Corporation

MTMA : Malaysian Textile Manufacturers Association

NIE **:** Newly Industrialising Economies

QA : Quality Assurance

QC : Quality Control

QI **:** Quality Improvement

QM : Quality Management

QMS : Quality Management System

RTW : Ready-to-Wear

SIRIM **:** Standard Institute of Research and Industry Malaysia

SME **:** Small and Medium-Sized Enterprise

SOCSO : Social Security Organisation

SOP : Standard Operating Procedures

SQC : Statistical Quality Control

TQM : Total Quality Management

WRAP : World Responsible Accredited Production

CHAPTER 1

Introduction

1.0 Introduction

This chapter provides a research background which cover an overview of Quality Management (QM) in the Malaysian manufacturing context and some of the issues in the adoption of QM in Ready-to-Wear (RTW) garment industry. It will explore the main research problems, identify the research aims and questions, as well the potential contributions of this research. The structure of this thesis is outlined in the end of this chapter.

1.1 The Internalisation of QM in Malaysian Manufacturing Context

QM has emerged as a key to global competitiveness over centuries. Historically, the evolution of QM has been stimulated by the growth of industrial-based economics across the world. QM has become a pivotal role to facilitate organisations in managing its resources, strengthen and improve the value chain in manufacturing. Considering the positive outcomes attained throughout the manufacturing system, QM has rapidly gained acceptance notably in the developing countries of Southern Asian region due to the importance of manufacturing activities as a catalyst to the country's economic growth. Studies over the past two decades have concluded that the QM practices and the adoption to the international quality standards were significant and relevance to the manufacturing industries, yet it has been a key to penetrate the global market (Qiu, 2009; Abdullah, 2010; Sidin, 2014). Even though QM is originally developed from the manufacturing setting, the adoption of QM among manufacturing firms are left behind (Ericksson, 2016). Nevertheless, there has been considerable variation in the implementation of QM in the Southeast Asian countries as reported by Rahman and Tannock (2005). This research focused on Malaysia as a middle-ranking developing nation in QM terms compared to its competitors such as Indonesia, Thailand and Philippines (Rahman and Tannock, 2005).

Manufacturing in Malaysia is one of the fastest growing sectors that contribute to the economic growth (Ooi et al., 2013; Mustapha et al., 2013). In 2014, Malaysia had been ranked as the world's top manufacturing location by the global property agents, Cushman & Wakefield, based upon the costs of conducting business, the risks facing each country, and the conditions of operation. It also reported that the rise of Malaysia as the best market for manufacturing has resulted from sufficient and good facilities, as well reasonable tax rates. As according to Eleventh Malaysia Plan: 2016-2020 (Malaysia Economic Planning Unit, 2015), the country is now approaching its journey towards accomplishing the vision 2020 which has been strategically planned by the government in 1991 (Islam, 2010). Moving forward to achieve greater achievement in the global landscape, the government has established strategies to boost both productivity and innovation to become an advanced nation that is inclusive and sustainable by 2020 (Malaysia Economic Planning Unit, 2015). With a good manufacturing environment offered in Malaysia, it is essential for the industry to build and sustain a consistent nature of quality through systematic management systems and to continually improve the systems to assure the products supplied to the customers are of superior quality.

In relation to the internalisation of QM, the concept of QM was relatively new to the Malaysian manufacturing, even after few years the ISO 9000 family of quality standards were launched in 1987. However, several Malaysian companies managed to become ISO certified in the late eighties (Idris et al., 1996). During mid of nineties, Malaysian researchers have begun embarking into QM research as they realised the roles and good impacts of QM in the manufacturing companies. The scope was much given in the field of automotive (Zadry and Yusof, 2006), electrical and electronics (Quek Eng Eng, 2003; Deros et al., 2008; Ahmad and Yusof, 2010) and other non-textiles SMEs manufacturing industries (Hassan, 1996; Yusof, 1997; Agus and Abdullah, 2000; Rahman and Tannock, 2005; Abdullah, 2010; Anuar and Yusuff, 2011; Mustapha et al., 2011). It was reported by Sidin (2014), in 2003 the Vice-President of Federation of Malaysian Manufacturers stated that the local manufacturing companies have experienced difficulties in maintaining its quality. Furthermore, QM implementation, notably among Malaysian SMEs have made little progress and not efficiently well maintained (Zadry and Yusof, 2006). Despite the weaknesses highlighted towards the adoption of QM, Sidin and Wafa (2014) strongly

believed that the QM has rendered more benefits to the manufacturing companies in Malaysia. Therefore, it indicates the necessities of QM in manufacturing as survival strategies in global business world.

1.2 Challenges and Quality Management Issues affecting the Ready-to-Wear (RTW) garment industry

Garment manufacturing business has been a driving force of the economy in Southeast Asian countries and these developing economies have been growing as a low-cost manufacturing centre (Goto and Endo, 2014). It also provides the opportunities of employment as well generating wealth to the country (Bruce et al, 2004). A large labour supply and production capabilities for mass production garments were the key factors for relocation decision among the countries from advanced industrial economies as well as newly industrialising economies (NIEs) for garment assembly in the Association of Southeast Asian Nations (ASEAN region). In fact, they were sourcing in low wage countries to achieve lower cost of production (Jin, 2014). It was reported by Kim et al. (2006), in the 1980s, Malaysia together with Indonesia, Philippines and Thailand emerged as the second generation of textile and apparel exporters after restrictions imposed on the Asian *Four Tigers*, Hong Kong, Korea, Taiwan and Singapore resulted from the Multi-Fibre Arrangements (MFA). To become truly competitive in the global market, there was urgency for manufacturers among Asian developing countries to enhance their comparative advantages by improving product quality and production efficiency instead of focusing ultimately on low wages (Wang, 2013). As such, manufacturers have taken a step further by implementing QM practices to enhance the management system in the RTW garment supply chain, so that all the challenges in this industry can be controlled and continually improved.

Undoubtedly, quality has been crucial in the garment supply chain as a global business. One of the main reasons is due to the outsourcing. Global sourcing referring to activities of purchasing raw materials from overseas suppliers and producing RTW garments at low-cost countries where the contact manufacturers are located. Several studies have reported that global sourcing one of the biggest challenges to maintain quality in the garment industry. For instance, quality of final products in the off-shore location was reported as less satisfactory (Teng and

Jaramillo, 2005; Yu and Lindsay, 2011) with several raised issues related to ineffective quality control (Rabolt, 1988), poor quality management (Leung, 1996), limited use of advanced QM tools (Fatima and Ahmed, 2005:2006), language and cultural barrier (Chen et al., 2007), and poor execution of quality management practices (Yu and Lindsay, 2011). In addition, the industry has been challenged with manufacturing complexities and unpredictability in the demand from various customers (i.e. in style, design, colour, size and material) as well as short product life cycles (Iwaarden et al., 2006).

Besides issues related to global sourcing, QM implementation is also affected by human factors, where quality was largely ignored by individuals involved in the manufacturing process. The sewn product industry until today has remained highly labour-intensive, hence increasing the tendency to get variability of garments along the supply chain. Despite the existence of advanced technologies to minimise human errors and to shorten the lead time of production (Vorokolu and Park-Poaps, 2008), the industry places too much reliance on the source of manpower for manufacturing activities. Poor handling by production workers would potentially lead to quality problems at all stages of manufacturing, thus impacting the cost of quality (Nikolaidis & Nenes, 2009). The failure to implement full automation in the garment production has become a major concern (O'Connor, 2002; Goto and Endo, 2014) and human workmanship for smooth seaming processes is still essential to produce high quality products (Miller, 1998; Romano and Vinelli, 2001; Crinis, 2010). Thus, scarcity of skilled workers in clothing production could be the main problem in this industry, where appropriate skills are generally acquired through industrial experiences (Smakman, 2004). As human factors play an important role in implementing QM activities, poor execution of QM in garment manufacturing due to a lack of commitment among all level of employees, needs to be addressed to ensure a durable competitive advantage (Khalid et al., 2011; Syduzzaman et al., 2014). Besides focusing on the human aspect as operatives and technologies used for daily production, the quality of materials received from suppliers must be guaranteed (Romano and Vinelli, 2001). This would prevent the current excessive focus given to the reworking and repairs to both semi-finished and finished garments due to low quality of materials received from suppliers.

Understanding the challenges in this industry, Bheda (2004:2) highlighted the following issues in his article on the cost of poor quality, *In the days when other industries are measuring quality in terms of 'defects per million pieces or opportunities' and are adopting Six Sigma methodologies for breakthrough improvements, the apparel industry still struggles to achieve the quality performance to meet AQL 2.5 based inspections*. According to Bheda (2004), manufacturers find it difficult to maintain a consistent quality in manufacturing based on the AQL-based inspection, whereby the rejection rate could exceed 2.5% in 100 pieces of garments randomly selected for inspection. The failure to attain AQL 2.5 for garment inspection could be caused by all manufacturing elements such as operators, procedures, machines, materials and it is not easy to control. Thus, it shows that quality has been crucial for the garment manufacturing industry, even in today's contemporary business environment.

1.3 RTW Garment Manufacturing in Malaysia – Industry Insight

The history of Malaysia's textiles and garment industry began in the early 1970s when the country shifted from import substitution towards an export-oriented industrialisation as a part of the government New Economic Policy (NEP) (Crinis, 2002; MIDA, 2013). Beginning 1980s, Malaysia's garment industry established itself as a contract manufacturer of high-end global brands, such as Marks & Spencer, Hills & Brooks, Guess, Tommy Hilfiger, Adidas, Nike, Oshkosh, GAP Kohl's and many others (Seong, 2007). The industries have experienced substantial growth since the mid-1980s onward due to the influx of NIEs investments of these big three textile exporters – Taiwan, Hong Kong and Korea (O'Connors, 1993), but has been relied on contracts from the United States for its survival (Crinis, 2012). Until 2015, the major export markets for Malaysia's textiles and garment industry were United States, Japan, Turkey, Singapore, Indonesia and China, while the main RTW garments for export were basic casual, sportswear and knitwear (Smakman, 2003; MIDA, 2017).

According to Malaysian Investment Development Authority (MIDA), to date, more than 68,000 workers are currently employed in the textile and garment industry, presenting 970 registered establishments (MKMA, 2016). Ministry of International Trade and Industry reports that over 400 out of 970 companies specialises in RTW

garment manufacturing (MKMA, 2016). The industry is dominated by small and medium enterprises (SMEs) and is locally owned Chinese businesses (Smakman, 2003), or by Singaporean, Hong Kong or Taiwanese companies (Crinis, 2010). There are also large companies operated either by foreign multinational or Malaysian Chinese owned publicly-listed companies (Crinis, 2010). Meanwhile, the involvement of Malays in the apparel business are quite limited to specific end products such as traditional Malay costume and government agency uniforms (Crinis, 2010). However, the emerging fashionable Islamic apparels among Malay consumers have become a new strength of Malaysian RTW garment industry (MATRADE, 2017). As a result, there has been increasing number of Malay entrepreneur's joint venture into garment manufacturing business to cater for the local demand of Islamic clothing.

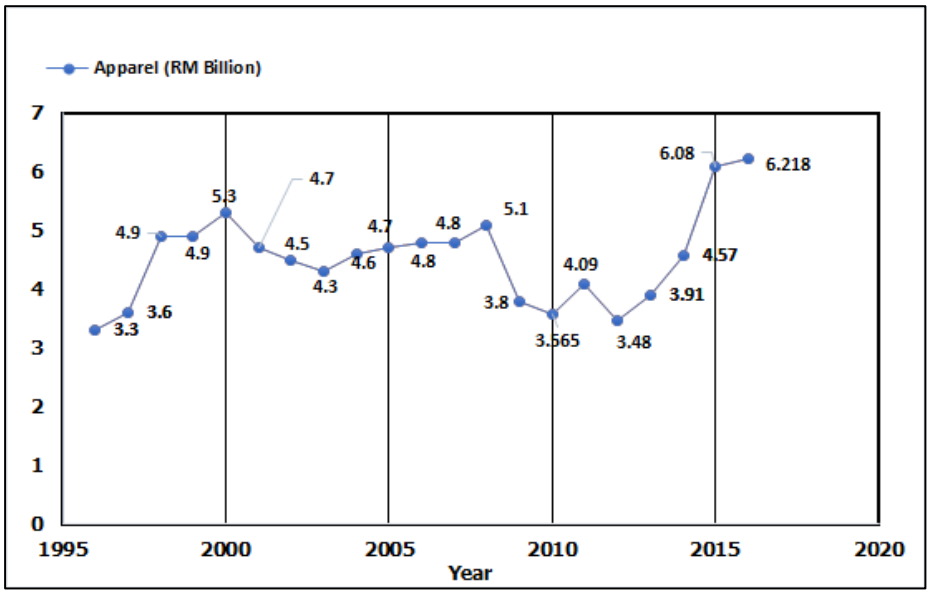
The Malaysian Textile Manufacturers Association (MTMA) as cited in Seong (2007) estimated that the export value of this industry accounted for approximately two per cent of the world textile and apparel trade. The export value was generated up to RM13.2 billion in 2015 (MIDA, 2017) compared to RM10.6 billion in 2006 (Seong, 2007). Malaysian government believes the textile and garment industry will remain significant in terms of investments and export earnings (MKMA, 2006). Despite the tenth ranking for the largest export earner contributing to Malaysia total export manufactured goods in 2015 (MIDA, 2017), the government still regards the textile and garment industry as an important contributor to the economy with great potential. MKMA (2016) reports a rise of global demand towards made in Malaysia apparel, as well as purchasing power in major importing countries, notably the US, European Union countries and Canada increased the export value by 10 per cent from RM6.33 billion in the first six months of 2015 to RM6.99 billion during the same period in 2016.

Based on the potential growth and export (see Figure 1.1), the Malaysian government has targeted textile and garment manufacturing sector for further development and promotion in the Third Industrial Master Plan 2006 - 2020 (IMP3), to achieve long-term global competitiveness. The action plan has been formulated and translated into six strategic thrusts covering the following strategies:

i. Promoting investment in higher value-added textiles and apparel
ii. Sustaining the market share and promoting exports

iii. Intensifying regional integration
iv. Enhancing domestic capabilities and facilitating the utilisation of technologies
v. Enhancing skills
vi. Strengthening the institutional support

Figure 1.1 Malaysia Exports of Apparel by Year (MKMA, 2017)



Source: Department of Statistic

The six strategic thrusts are a consecutive of continual effort and support shown by the government to ensure sustainability of the industry for Malaysia's economy. It has been reported that the industry is still growing at a healthy pace as a producer of apparel product exports (Wang, 2013). The investment and export value of Malaysia's textiles and garments from the year of 2006 to 2016 are shown in Table 1.1.

Table 1.1 Projections for Malaysia's Textile and Garment Industry

	2006-2010	2011-2015	2016-2020	2006-2020	2006-2020
	(RM Billion)				Average Annual Growth (%)
Investments	4.0	4.6	5.1	13.7	3.1
Investments per year	0.8	0.9	1.0	0.9	NA
Export (end period)	13.4	18.2	24.0	24.0	5.8

Source: Ministry of International Trade and Industry (MITI)

The country has built good reputation as a supplier of RTW garment production to international brand owners. There are several reasons that have made Malaysia as a preferred location for manufacturing, namely in the aspect of quality, efficient communication and infrastructure, government support for business investors, the adoption of the codes of conduct, compliance to global standards (Crinis, 2010:2012) as well logistic performance (Wang, 2013). In fact, several Malaysian high-fashion producers have gained trustworthiness from niche market designers due to the quality and prompt delivery (Crinis, 2012). In the Eleventh Malaysian Plan which caters for the period 2016-2020, textile and garment industry has remained as one of the important export contributor of the country based on the designed strategic framework for manufacturing sector established by the government. New strategies were again outlined as stated in the Eleventh Malaysia Plan: 2016-2020, to stimulate growth and development of the manufacturing sector, with emphasis to enhance R&D activities, utilisation of sustainable manufacturing practices, compliance to global standards and collaboration between stakeholders (Malaysia Economic Planning Unit, 2015)

1.4 The Importance of a QA framework for an Effective QM implementation in (RTW) Garment Manufacturing Industry

As the world is changing very fast, quality thinking and concepts in manufacturing have evolved from basic inspection processes and quality control to more focused quality strategies for overall organisational performance, namely Total Quality Management (TQM) and business excellence (Brown, 2013). On the basis of business survival, the adoption of Quality Management (QM) in the manufacturing sector is not merely an option, but it has been a paramount quality agenda for both short and long- term quality improvement. To date, research in QM still gains much interest among academics, even the ISO 9001 QA systems have been well-researched with many versions of success stories and controversial issues across the globe (Oke and Owaba, 2007; Mendes and Lourenco, 2014). However, QM research in labour-intensive manufacturing companies in developing nations was given less attention (Rahman and Tannock, 2005; Belay et al., 2012) and the reasons for the slow adoption of QM among manufacturing companies really needs further research (Mendes and Lourenco, 2014). In the case of RTW garment manufacturing, the industry still lacks knowledge on quality and QM, notably in

maintaining the effectiveness of QMS, hence leaving a big gap between the adoption of QMS and the implementation status among garment companies (Matebu, 2006). Furthermore, the industry was not utilising completely the QM practices to the maximum, and advanced concepts are not successfully adopted (Fatima and Ahmed, 2006; Matebu, 2006; Norton, 2007). Those issues have made the selection of garment industry in this research significant as the industry appears to have more problems with maintaining high quality levels compared to others (Iwaarden et al., 2006).

Garment manufacturing processes are particularly complex due to the unpredictable challenges appearing along the supply chain that might affect the quality of final products (as described in section 1.2). This situation predisposed the senior management of a company to adopt a systematic approach to corrective and preventive measures to achieve the company's quality goals and indirectly fulfil customer requirements. ISO 9001 QA systems are a well-known international quality standard among garment manufacturing companies to assist them in achieving consistencies in daily production processes, as well in building good reputations as manufacturing companies. According to ISO, the standards have been developed to suit all type and size of businesses. Therefore, it is not surprising to see many textile and apparel companies taking up the ISO certification. Several studies found that the adoption of QMS ISO 9000 in the textile and apparel industries were not fully achieving the outcomes, yet made the impact of its implementation throughout the companies deemed unclear and remain questionable (Fatima and Ahmed, 2006; Thaver and Wilcock, 2006; Irshad and Mahmood, 2011). Therefore, the position of TQM also remains ambiguous (Chen, 2005).

Furthermore, as the evolution of QM was getting expanded with an advanced concept for continual improvement such as lean approach and six sigma, garment industry was left behind in the adoption of the advanced QM practices. Many manufacturers still equate QM with the traditional quality control (QC), hence it seems impossible to remove and even minimise the control approach in the manufacturing system (Bheda, 2004). Although the garment companies successfully obtained the ISO accreditation and complied with the requirements of the international standards, the 'reactive approach' of inspection and quality control are

still widely used instead of ‘proactive approach’ (Towers and McLoughlin, 2005). The practice of quality inspection based on the detection of non-conforming products was conducted for RTW garments rather than paying attention to maintaining the quality according to the principles of QM. This has been the major problem in establishing an effective QMS in the garment manufacturing industry when the control systems are used substantially, even if the company is ISO certified.

Previous studies have not been able to establish a suitable QA framework which can fit the RTW garment manufacturing sector with the existence of challenges and QM issues confronted by the peoples involved in the industry. Belay et al. (2012) recommended that devising reliable management systems that is appropriate and fit labour-intensive manufacturing companies should be carried out for the survival of the organisation. This problem represents an interesting research gap particularly in the context of implementing a successful QM in a labour-intensive manufacturing environment. Therefore, those above-mentioned challenges should be addressed by researching and evaluating the strategies towards successful adoption of QM approaches in the industry, since QM is context dependent (Iwaarden et al., 2006). Moreover, research by Yusof and Aspinwall (2000b) has suggested QM should be defined to be more reflective of the context and circumstance in which they operate as different model and framework may result in different outcomes (Mosadeghrad, 2013) according to the nature of business. In relation to Malaysian RTW garment industry, it has been proposed for future research by Abdullah (2010) in his TQM research among the Malaysia’s SMEs. To date, there remains relatively little research into the implementation of QMS amongst the manufacturers. Most QM research has tended to focus on industries in the field of automotive (Zadry and Yusof, 2006), electrical and electronics (Quek Eng Eng, 2003; Deros et al., 2008; Ahmad and Yusof, 2010) and others non-textiles SMEs manufacturing industries (Hassan, 1996; Yusof, 1997; Agus and Abdullah, 2000; Rahman and Tannock, 2005; Abdullah, 2010; Anuar and Yusuff, 2011; Mustapha et al., 2011).

It was reported that Malaysia has been chosen as one of relocation destination for mass production from Asian NIC countries (Gamble et al., 2004) and has shown exemplary performance amongst Southeast Asian countries in supplying the RTW garments to the export market (Crinis, 2010, 2012). As reported by Malaysia

External Trade Development Corporation (MATRADE), made in Malaysia apparel has gained international recognition due to the country's reputation as reliable suppliers in term of quality and delivery (MATRADE, 2013). Therefore, a study that analytically determines the QM profiles amongst Malaysian manufacturers is vital importance to be carried out as a theoretical contribution to the area of QM and its managerial implications for continual improvement. Therefore, a QA framework that fits the purpose should be proposed to serve garment manufacturing business characteristics as to its suitability and applicability. The critical analysis from this study would lead to a development of a QA framework for an effective implementation of QM which can benefit the labour-intensive manufacturing companies, particularly for the RTW garment industry in Malaysian context.

1.5 Research Aims and Questions

The key issues pertaining to QM implementation in RTW garment manufacturing sector as explained in the previous section have shown the importance of conducting this study. It is not only for the future economic of Malaysia but also to determine the best strategies to sustain the adoption of QM among garment companies in labour-intensive manufacturing environment. In this study, the following research aims are developed to address the key issues and achieved through two phases of data collection of mixed-method research.

This research aims to;

1. Document and analyse the QM practices of RTW garment manufacturing in the Malaysian context for quality monitoring of mass-produced garments produced using human skills for the domestic and export market.
2. Critically analyse how QM has been implemented in the RTW garment manufacturing industry and identify factors inhibiting the production of TQM products.
3. Develop a QM framework for an effective implementation of QMS in the Malaysian RTW garment industry as a new contribution towards a successful journey of quality excellence in a labour-intensive manufacturing environment.

In relation to the above aims, the following research questions (RQ) were critically developed so that the findings obtained can provide justifications in achieving the aims. The research questions are as follows;

- What are the QM approaches used by the Malaysian RTW garment manufacturers to produce high-quality garments?
- What are the stages of QM adoption?
- How are QM practices being internalised in the Malaysian RTW garment industry, as perceived by quality practitioners, to meet the market segment needs locally and abroad?
- Why managing quality in the RTW garment industry has been perceived as challenging and difficult? And what are the reasons that have hindered the implementation of Total Quality Management (TQM) in this industry? How can this situation be improved?
- What is the most suitable QM framework for RTW garment manufacturing industry? How can it be developed?

1.6 Research Contributions

New contributions of the research are established and explained based on the theoretical and managerial implications as follows;

1) The study extends literature on QM with a new knowledge on QM implementation by focusing on human factors in RTW garment industry sector based on Malaysian perspectives. It was noted that manufacturing companies in developing economies were left behind in the adoption of QM practices (Belay et al., 2012; Mendes and Lourenco, 2014). Additionally, the garment industry has been complacent with control of manufacturing system as compared to prevention (Bheda, 2004; Towers and McLoughlin, 2005). This research develops a QM framework which theoretically contributes to Malaysian textile and apparel business for an effective implementation of QM in RTW garment manufacturing. It was noted that employees' productivity is crucial for the success of labour-intensive manufacturing companies (Belay et al., 2012). Therefore, this new framework could also be proposed and adopted in other labour-intensive

manufacturing companies in developing countries as a strategy to foster engagement for continual improvement. Moreover, reliance on QM models for businesses of a different nature and a different type of product has been ineffective and there is a need to develop a QM framework based on the distinctive context of apparel (Yusof and Aspinwall, 2000b; Iwaarden et al., 2006; Mosadeghrad, 2013). Managing quality in a labour-intensive manufacturing environment deals heavily with human issues. This aspect should be a central focus when developing the most suitable QM framework for the garment industry compared to the industry utilising full automation for its manufacturing. This study furthermore contributes to the body of literature on how QM is perceived by people working in the industry and the stages for effective QM adoption in this manufacturing environment from the perspectives of ISO and non-ISO certified organisations.

2) This study provides QM guidelines for the Malaysian RTW garment manufacturing industry regardless of size and market destinations. These QM guidelines have been developed through a QM framework that better suits their business environment and highlights an appropriate human focus management system. This QM framework could be proposed as a solution to QM issues among manufacturers. To date, no studies involving RTW garment manufacturing in Malaysia have investigated this subject area to such an extent, thus this research is not only integral for the textile and garment industry, but also to other labour-intensive manufacturing companies, where human-based issues may be critically identified as the main problem. With the implementation of the QA framework, it is estimated that the industry which comprises of domestic and export-oriented producers would be able to sustain and contribute to Malaysia's economic growth towards achieving vision 2020.

3) This study generates new knowledge for both international buyers and RTW garment manufacturers on the role of ISO 9001 QA systems for manufacturing and to correct the existing misconceptions of this standard accreditation for managing people and quality in the clothing supply chain. This would help the

manufacturer to make a full use of ISO certification instead only for the sake of maintaining the contract from international buyers.

1.7 Structure of the Thesis

This thesis has been divided into seven chapters, which represents the key issues in detail as introduction and background of the study in this chapter. It also provides the research problem of the focused area in this research with the clear aims and research questions as well as potential research contributions.

Chapter 2 covers the comprehensive review of the literature concerning the definition and role of quality for RTW garments, the adoption of QMS in garment manufacturing, the utilisation of control systems quality management, the issues affecting the QM practices in the garment industry and finally the existing QM model and framework for RTW garment industry. This chapter presents the theoretical aspects in the implementation of QM and guides the researcher to build understanding towards the focused area of research based on what else needs to be done for QM research.

Chapter 3 explain the research methodology designed to achieve the aims of this research. It covers the theoretical justification or key decisions of mixed method approach selected for this research. Survey and case study methods used for data collection together with data analysis procedures are discussed in this chapter.

Chapter 4 contains the result and analysis for the survey. Prior to analysis, the significant findings were critically selected for further investigation for the second phase of study, which comprised of multiple case studies of Malaysian garment manufacturers.

The results and analysis were presented in Chapter 5. It covers the company overview and the analysis of each theme developed of the cases. Both Chapter 4 and 5 discuss the findings by reference to the reviewed literature that is relevant to the subject area. Thus, both chapters help the researcher to achieve the first and second aims of the research.

Chapter 6 provides a critical analysis towards a development of QA framework for an effective implementation of QMS in the RTW garment manufacturing industry for Malaysian context based on the findings from Chapter 4 and 5. The framework fulfils the final aim of this research.

Chapter 7 concludes the key findings, discuss the implication and provide suggestions for a future research

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

This chapter reviews the theoretical background and ideas related to the quality management practices in the garment manufacturing industry, which underpins this research. Section 2.2 and 2.3 begin with definitions of quality and the evolution of quality management. Section 2.4 explains the role of quality in the manufacturing sector. The importance of quality typically in the garment manufacturing sector and the processes involved are highlighted in Section 2.5 and 2.6 respectively. Section 2.7 elaborates the implementation of quality assurance systems and the application of various quality improvement strategies for embracing a TQM concept. Section 2.8 explicates the quality management based on 'control systems' which is found dominant for garment industry until present. Section 2.9 discusses quality control issues confronted by manufacturers which affected the adoption of an effective QM in the garment industry. This chapter ends with a summary in Section 2.10.

2.1 Evolution of Quality Management

A journey of quality can be traced via the transition of four different phases of quality movement over a century (See Table 2.1). The concept of quality has evolved from inspection-based activities of manufactured products before the era of Statistical Quality Control (SQC) and Quality Assurance (QA) were subsequently introduced and applied in the manufacturing industries. The statistical techniques for monitoring and improving the manufacturing processes received a great attention during the phase of SQC or Quality Control (QC) because of efforts made by Walter Shewhart in the 1920s (Evans, 2014). The primary QC activities are the evaluation and comparison of performance to goals during operation (Juran and Godfery, 2000). Thus, the first two phases of quality evolution were based on the control approach to quality management (Triparthi, 2010).

Table 2.1 Phases of Quality Movement (Adapted from Dale et al., 2007; Qiu, 2009; Kemenade, 2014)

Phases of Quality Movement				
Quality Waves	**Inspection (1900s - 1920s)**	**Quality Control (1920s - 1950s)**	**Quality Assurance (1950s - 1980s)**	**Total Quality Management (1980s - onwards)**
Approach	'Inspect' quality	'Control' quality	'Build-in' quality	'CI' quality
Focus	Products	Products	Processes	Peoples
Paradigm	Control		Continuos improvement	Continuos improvement and Commitment
Characteristics	Identify souces of non-conformance; Corrective actions; Conformance to specifications	Process performance data; Self-inspection; Product testing; Use of basic statistics; Basic quality planning; Develop quality manual; Paperwork control	Quality systems development; Advanced quality planning; Quality manual; Use of quality costs; Failure Mode and Effect Analysis (FMEA); Statistical Process Control (SPC)	Policy deployment; Involve supplier and customer; Involve all operations; Process management; Performance measurement, Teamwork; Quality culture; Customer focus; Employee involvement; Continuosly add value to organisation performance
Methods, Techniques and Tools	Sorting, grading, reblending, measuring, examining, testing and gauging	Statistical tools, Kaizen, Do it right the first time	TQC; Just-in-time; Lean production; QCC; PDCA	ISO 9000 series; Six Sigma; Lean production; Performance excellence (MBNQA; EFQM; Deming's prize); Benchmarking

Meanwhile, in the phase of QA, the focus of quality has changed from detection and rejection of nonconforming products to more proactive approach (Qiu, 2009). The main purpose of QA is to verify that control is being maintained (Juran and Godfery, 2000). In this phase, quality is not only functioning during the manufacturing processes but also is deliberately planned before the production begins with the aid of documentations. The major improvements at this phase are the quality system developments and the conformance to customer's specifications (Groocock, 2000). Therefore, the coverage of quality assurance has extended from selective departments mainly in the production and quality control to the entire organisation (Triparthi, 2010). As a result, the systemic approach to quality management was gaining acceptance during the phase of QA. As the awareness of quality increased

tremendously, the evolution of quality was moving towards achieving quality by managing people in the organisation through the concept of Total Quality Management (TQM).

At this phase, customer focus, continual improvement and total participation are given priority whereby the commitment of each individual in the organisation, including other members in the supply chain are integral to ensure the quality objectives can be accomplished (Jaccard, 2013). These four different phases of quality movement also known as a hierarchy of quality (Basu, 2004), have witnessed the changes on quality management as a concept and philosophy over centuries involving the processes, products and peoples as well different quality tools and methods to achieve quality goals in every organisation.

In moving towards the era of globalisation where organisations are exposed to increasing competitive pressure and customers demand (Weckenmann et al., 2015), the use of TQM label has given rise to many perception and interpretations (Fisher and Nair, 2009). Thus, various methods, techniques and tools have been developed to align with TQM philosophies. According to Beatty (2006) and Kemenade (2014), TQM, as modern quality paradigms have been focused to people as commitment to quality; therefore, involvement from all levels of employees for the effectiveness of management systems deployed are required. In viewing the trend and direction of QM implementation, TQM philosophies are still dominant in the mainstream. However, new quality models such as performance and business excellence based on the criteria developed for MBNQA and EFQM framework have been introduced as advanced concepts of quality to represent TQM adoption in organisations. Current research suggests that TQM should be rebranded by merging QM with innovation management (Lilja et al., 2017). According to Lilja et al. (2017), an updated version of TQM would bring innovation perspective into the QM systems, together with the elements of continuous improvement and operational excellence. Although the QM concept has evolved to new quality paradigms following the trend of today's market demand, the adoption to different phases of quality movement is still dependent upon how the organisation perceives and interprets QM to fit their business prior the real implementation.

2.2 The Quality Guru's Theory in the Development of QM

A development of QM concepts has been contributed significantly by the presence of QM gurus such as W. Edward Deming, Joseph M. Juran, Armand V. Feigenbaum, Philip B. Crosby, Kaoru Ishikawa and Genichi Taguchi. They have been recognised as the world's most influential quality gurus which have brought up their philosophies in adopting QM which can be applied in the manufacturing field (Basu, 2004). The philosophies promoted by the gurus help individuals and organisations to understand different perspectives of QM approaches and the strategies that can be taken to attain quality objectives prior to the real implementation. In short, the contribution of quality gurus has been paramount in the development of QM to strengthen the theories which can be applied in the organisation for quality improvement.

As a quality philosopher, each of them not only emphasised different steps toward successful implementation of QM, some of them established problem solving techniques and quality improvement solutions. Until today, the theories developed by the QM gurus are still dominant for quality thinking and movement, and yet some of the quality tools have been used widely to manage a numerical and verbal data. Of the various quality philosophers emerged since 1950s, W. Edward Deming, Joseph M. Juran, and Philip B. Crosby are three key individuals who have had the most impactful QM practices worldwide (Goetsch and Davis, 2006; Evans, 2014). Table 2.2 compares the approaches of these three major contributors of QM concepts along their journey to inculcate quality among organisations. Although the comparison can be made according to several criteria of QM (see Table 2.2), the philosophies of Deming, Juran and Crosby are found similar which was concluded by Ab Wahid (2006, p.31) as follows;

i. Each view quality as imperative in the future competitiveness in the global market.
ii. All agree that top management commitment is an absolute necessity for the success of quality in an organisation.
iii. All gurus place responsibility for quality on management, not the workers.
iv. All of them stress the need for continuous, never ending improvement.
v. All recognise the needs for and difficulties associated with changing the organisational culture.

Table 2.2 Comparison of Gurus Approaches (Ab Wahid, 2006)

Criteria	DEMING	JURAN	CROSBY
Definition of quality	a) Meeting and exceeding customer's need and expectation and then continuing to improve b) A predictable degree of uniformity and dependability at low cost and suited the market	Fitness for use	Conformance to requirement
Quality Process/ Approaches	Deming's 14 points	Juran's Quality Trilogy	Crosby's Quality Vaccine
Quality Emphasis	100% inspection responsibility in the system.	Improvement in the delivery performance and capacity.	Prevention in the system
Improvement Basis	Put everyone in the company to work to accomplish the transformation. The transformation is everybody's job.	Quality improvement is not fire fighting. Or removing a sporadic spike. More than that, quality improvement raises quality performance to unprecedented or break through levels.	Quality improvement is built on getting everyone to do it right the first time. Quality improvement is a process, not a programme, and it takes a long time for it to become a normal part of the scene.
Quality Improvement Solution	Promotes the Plan-Do-Check-Act cycle and uses statistics to measure performance in all areas.	Interrelation of quality improvement elements.	Administering the quality vaccine.
Organisation Management	Push senior managers to become actively involved in the company's quality improvement programmes. Explains that consumers are the most important part of production line. The management system has to enable everyone to be responsible for quality.	Control at all organisational level. Then establish project teamwork with clear responsibility. Need special organisational structure.	Does not believe that workers should take prime responsibility for poor quality. Management sets the tone of quality and workers follow it.

Based on the theories developed by Deming, Juran and Crosby, it shows that the awareness to build a culture of quality in the manufacturing environment has been the main agenda of each QM philosophers even though the approaches promoted by them are different. The focal points can be derived from the involvement of quality guru's in the evolution of QM are their theories and concepts have been used to establish QM principles, systems and tools to suit with today's manufacturing supply chain which can lead to organisational transformation.

2.3 Definitions of Quality

According to the British Standard BS EN ISO 9000:2005, quality management system – fundamentals and vocabulary, quality is defined as *degree to which a set of inherent characteristics fulfil requirements*. This definition is applicable to all manufacturing industries and service-oriented businesses which operate globally, as it reflects each company's mission and vision to satisfy their target market (Abdullah, 2007). Despite the existing definitions and concept of quality which can be instantly recognisable from the pioneer of quality philosophers such as 'fitness for use' by Joseph M. Juran, 'conformance to requirement' Philip B. Crosby, and 'Total Quality Control' by Arman V. Feigenbaum (Zairi, 2013), the term quality also has been defined by other quality experts and academics at different organisational levels and functional areas, based on the nature of the industry (Hassan, 1996; Qiu, 2009; Conti, 2010). This has been demonstrated by with the emergence of journals and other publications in the mainstream that have been massively published in the past two decades (Brown, 2013).

Among various definitions, quality is commonly defined as meeting or exceeding customer expectations (Brown, 2013), instead of other definitions such as consistency, eliminating waste, providing a good and usable product and doing it right the first time (Evans and Lindsay, 2007). Garvin (1988) proposed that quality can be defined as product-based, user-based, value-based and manufacturing-based to suit the context in an organisation (Mehta, 2004) which has been used in many publications (Kadolph, 2007; Evans and Lindsay, 2007; Bubonia, 2014). In the management perspective, Jaccard (2013, pp 25) defines quality as an implementation of certain functions to obtain, to allocate, and to use human (personnel, supervision) and material (raw materials, energy, components, etc.) resources to accomplish a goal in line with the needs of a company. As such, quality retains a broad meaning to individuals and organisations, notably in today's contemporary business environment and its value chain (Dale et al. 2007; Juran and De Feo, 2010).

2.4 Quality in Manufacturing Sector

Quality has always been the main agenda in the large-scale production of consumer goods (Jaccard, 2013; Brun & Moretto, 2014). In manufacturing, the operations are typically carried out to transform the materials into the value-added final products (Juran & De Feo, 2010) and quality in this context is commonly seen as free from defects and significant variation by putting a consistent commitment to certain standards (Landeghem, 2015). Manufacturers are continually optimising their QM strategies to meet the demand for high-quality and inexpensive products from global customers (Battini et al., 2012).

Despite the existence of key business concepts or phrases for quality movement, quality remains the critical factor in manufacturing due to competitiveness (Anuar and Yusuff, 2012; Battini et al., 2012). Gryna et al. (2007) put emphasis that the "world class" quality levels are prevalent in today's market need as products and processes are becoming more complex. However, some variation in each single manufactured product is inevitable. W. Edwards Deming, one of true management gurus raised the issue of variations in quality and a need to understand it in his second part of Profound Knowledge, which was a summary of his philosophy a few decades ago (Evans and Lindsay, 2007). Until today, manufacturing systems in the factory can be very complex and companies in every sector are still struggling to have a consistent quality due to unacceptable variations in the manufacturing process (Norton, 2007; Sidin, 2014). In fact, people who perform various functions in the manufacturing systems and communicate information throughout the company supply chain are the main contributor to quality (Beatty, 2006). Consequently, when these elements are not controlled by the company, defective parts will be increased and give impact to the cost of goods (Nikolaidis & Nenes, 2009).

In the manufacturing-based perspective, quality is synonyms with a slogan *conformance to specification*, thereby all efforts and initiatives to comply with product's specification are planned and systematically implemented to achieve the goal (Evans and Lindsay, 2007). Kadoph (2007) also has viewed quality in manufacturing as conformance to specification and standard but explained it in the context of producer perspective. Initially, all products are designed with specifications - the criteria or dimension that must be met by a product to assist the

production team to produce the right product to the customer (Rosenau & Wilson, 2006). Each specification is developed with the target and tolerance, which allows variation from the target that been determined in the specification (Glock & Kunz, 2005;109). At the level of production, the target and tolerance of a specific product must be met and the consistency of the result must be achieved, not only to satisfy the manufacturer's expectations for quality and performance but also to indicate the extent of the company's solid commitment to quality (Kadolph, 2007). Nevertheless, for the survival in this competitive and global business environment, quality should be viewed as a way of organizational and everyday life, as emphasized by Dale et al. (2007:23), quality is driven by a person's own internal mechanism – 'heart and soul' and 'personnel believe' which mean a persistent commitment and participation from everybody in the organisation is needed. As such, individual's quality is an essential ingredient to ensure the survival of quality in the workplace (Evan and Lindsay, 2007: 31).

2.5 The Importance of Quality in Garment Industry

Customers worldwide aim for higher quality, reduced inventories and faster response time in the 21st century (Gryna et al. 2007). After the emergence of the industrial revolution in the middle of the eighteen century (Jaccard, 2013), a tremendous demand for the mass-produced garments had been stimulated by an existence of the sewing machine (Burns & Bryant, 2007). At that time, the garments were produced in a shorter time compared to the custom-made. The awareness of quality was evidenced by the allocation of inspectors to check the entire garments. The focal point of manufacturers is to produce products at the acceptable level of quality so that they could attract the end customers. Similarly, the customers would preferably buy the best quality products that are usable and give them a value for money.

From that point of view, the concept of quality has gained a wide acceptance for more than a century, and continues to be relevant and vital in this era of globalization and for a survival in the market (Battini et al, 2010; Antony, 2013; Brown, 2013; Lee et al, 2013).

The garment industry has distinctive features compared to many other manufacturing industries particularly in the uses of automation and computerisation, evaluation criteria, high volume and complexities of products and short product lifecycle (Jin, 2014). The role of quality covers the entire process of producing the finished garments regardless the stage of pre-production, production and post-production. Thus, the utmost importance of quality in the garment industry not only limited to the technical aspects of production which included its design (Kuang-Ying Loo and Hackley, 2013), but also in the aspect of the whole management system in the organization (Chuter, 2002; Glock & Kunz, 2005; kadolph, 2007). The evolution of quality in manufacturing has changed drastically from regular daily inspection to the rigorous and yet efficient process of quality control and assurance before the concept of total quality management has been used widely amongst organizations globally as an effective management system (Evans and Lindsay, 2007). Gersak (2013;98) also provides her thought that quality is directly linked to profitability. Quality is the important performance indicator that must be built into each style produced in the garment manufacturing sector (Rosenau & Wilson, 2007). Therefore, the fact is indisputable – quality is an indispensable aspect of the company's management system (Das, 2009).

The importance of quality in the garment industry was influenced by the nature of fabrics and other supplying materials needed to produce the entire garments which all contain variations (Matebu, 2006). This applies to the whole process of apparel production. In the manufacturing-based perspective, the production of garments is subjected to compliance to the international standard and specification purposely to control the product variation – variations in a daily production are inevitable (Matebu, 2006). Customer's needs are translated into a quality specification that set out exactly the dimensions and other details of the product as the guide to the manufacturer (Chuter, 2002). The quality specification should be developed accordingly as inadequate product specifications can be one of root causes of many problems (Chen, 2005). Chuter (2002) highlighted that no single product can be produced exactly as the specification – there must be a limit within errors that are permitted during production. The specification for each style of garments is developed with a tolerance that will prevent the 'out of specification' garment reaching the end customer. This is mainly because of flexible materials used for

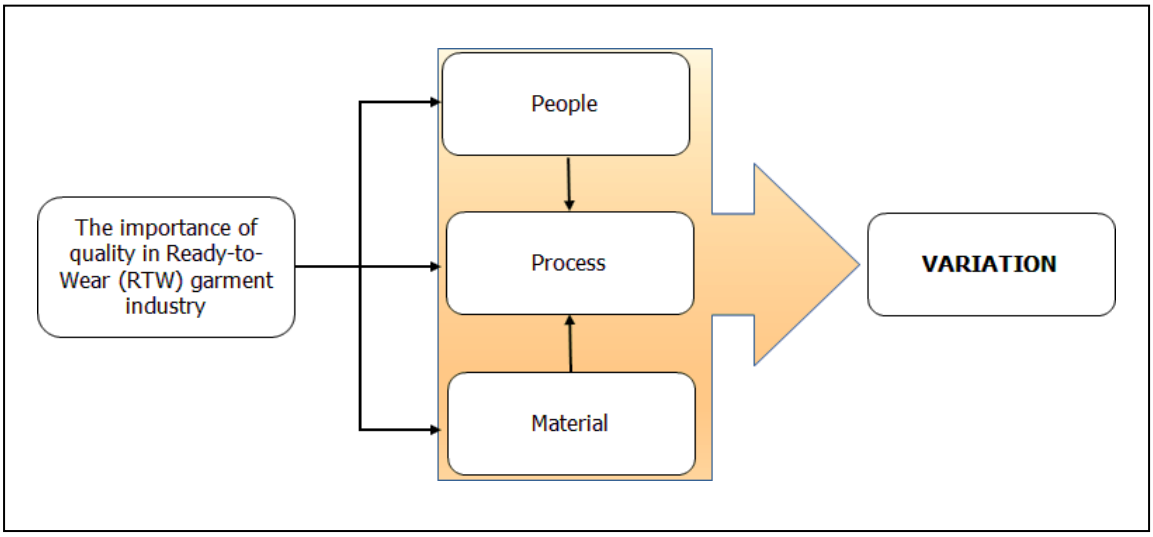
making garments (Jin, 2014). Glock and Kunz (2005) added some good points to explain this situation whereby according to them the materials used to make a complete garment are not rigid but are extensible - thus a minimum variation of 0.1 inch is deemed acceptable.

In addition, garment manufacturing is a labour-intensive industry, which means the industry is relying on the human skills and capabilities to perform the work in the factory. Islam & Shazali (2010: 567) defined labour-intensive as the use of manpower in the production process with little support of technology, whereby the labour-costs are given priority. It was said earlier by Jin (2004) that the nature and complexities of garment production make it difficult to completely implement a labour-saving technology. Since quality holds a significant importance in the global trade, the garment exports from developing countries play a vital role in their national economies (Wang, 2013). Most of the international firms are involved in off-shore production whereby the production of the garments is located in specific developing countries for their cheap labour and operational costs (Chowdhury et al. 2007; Yu & Lindsay, 2011). Jaccard (2013) highlighted that the intercontinental distance and cultural difference are often factors of misunderstanding in the globalization of exchange. As such, communication issues between buyers and manufacturers due to cultural and language difference can affected the garment supply chain in the aspect of quality (Chen et al., 2007; Yu & Lindsay, 2011).

Moreover, the workers could not produce the same level of quality for each piece of garment – thus the variation in garment's quality must exist particularly when dealing with bulk production (Kadolph, 2007). Due to this situation, human errors must be occurring repeatedly from operators that are handling different materials or machines which need a regular and consistent monitoring from the respective person or department (Glock & Kunz, 2005). The processes of bundling, sewing and trimming operations added difficulty to the manufacturing process (Bubonia, 2012). Gunesoglu and Meric (2006) stated that the properties of fabrics and human emotion are those factors that will affect the daily operations of garment production. Therefore, quality inspectors are trained to be responsible for checking and monitoring the quality of garment parts and finished garments, due to many reasons for 'out of control' to occur during the production process.

According to aforementioned literature, Figure 2.1 summarise the core manufacturing elements that affects the garment industry. The variation from these different sources have made quality as a topical issue for manufactured garments.

Figure 2.1 The importance of quality for garment industry



Although variation will be accepted as long as it falls within specifications, without appropriate planning and strategies to control and minimise the variation, the production may not run smoothly. Therefore, the variation occurring due to human, process and procedures as well materials received from suppliers must be identified and preventive action should be determined. As depicted in Figure 2.1, manufacturing processes should be managed and operated by competent personnel, by using good quality materials to guarantee success in producing the right product and satisfying customers (Brown & Rice, 2001).

2.6 Quality Processes in the Garment Industry

Undoubtedly, the quality processes developed and adopted in the garment industry can produce an impressive result in the product's quality and performance as long as quality initiatives take place in the organization. Numerous authors have outlined quality processes that have been successfully implemented in the garment companies (Brown & Rice, 2001; Chuter; 2002, Glock & Kunz, 2005; Rosenau & Wilson, 2006; Kadolph, 2007). However, the scope of quality processes in the past ten years have involved the quality concern of merchandiser during product development, whereby some critical components are highlighted (Glock & Kunz,

2005; Rosenau & Wilson, 2006; Kadolph, 2007). According to them, the scope of quality includes the process of selecting and evaluating raw material from various vendors, the development of pattern and measurement of fit together with a well-planned construction based on the existing standard and specification. On the contrary, most of the quality processes during the eighties and nineties were focusing on the aspect of testing, inspection, statistical quality control (SQC), sampling and some of the quality improvement tools (Solinger, 1988; Brown & Rice, 2001; Chuter; 2002,). Nonetheless, according to the cited literature, it can be summarised that the quality processes in the garment industry comprises of all quality activities developed and implemented in the organization's management system as the work done is devoted to preventing nonconformities reaching the customer.

Although the implementation of total quality integrates all employees at the different level of management from various departments, the quality department perhaps is the most important department to lead the quality movement in the organization. Brown & Rice (2001) stated that the quality-conscious company is staffed by individuals that are competent in quality and are assigned with varying responsibilities to help the company to achieve the quality objectives. The quality department is established to reduce the amount of bad work being made by detecting the defects earlier in the production process from reaching the customer (Chuter, 1995). Thus, the appropriate corrective action can be taken to prevent defects and preventive measures can be planned to stop the repeated problem from keep occurring in the future (Solinger, 1988).

For quality monitoring, a series of inspection process is conducted from the stage of receiving the fabrics and findings until the complete garments are packed for delivery. During sewing of the garment parts, QC inspector will conduct the in-line inspection to ensure the garments are sewn correctly as according to the production and measurement specification (Brown & Rice, 2001; Rosenau & Wilson, 2006; Burns & Bryant, 2007; Kadolph, 2007; Rahman, 2010). Before the garments are ready to pack, the quality control inspector will again inspect the finished garment based on different parameters such as design, size, fit, appearance, construction and function (Kadolph, 2007). The quality inspection is the utmost important process

in the garment industry as to ensure customer's needs and expectation can be fulfilled (Rahman, 2009) by conforming to standards (Glock & Kunz, 2005).

Besides building in quality and conducting the inspection, different approaches and practices have been utilized to control and monitor the quality problems encountered during production particularly in the sewing assembly line. Previous studies have reported that the use of quality improvement tools in the production process has assisted them to do a systematic, data collection and analysis to investigate and take an appropriate action to help companies minimize the rejection rate (Bruscas and Groves, 1998; Romano and Vinelli, 2001; Kumar and Sampath, 2012; Ahmed, 2013; Gorener and Toker, 2013). Almost all studies have evidently used the tools and experienced positive results. Section 2.7.7 in this chapter explains the quality improvement (QI) tools used for the garment industry. In summary, the literature provides understanding even though the manufacturers have implemented QI activities, they still rely on Quality Control (QC) and inspection processes to ensure conformance with customer requirements.

2.7 Quality Management System (QMS) in the Garment Industry

2.7.1 Definition and Implementation of QMS

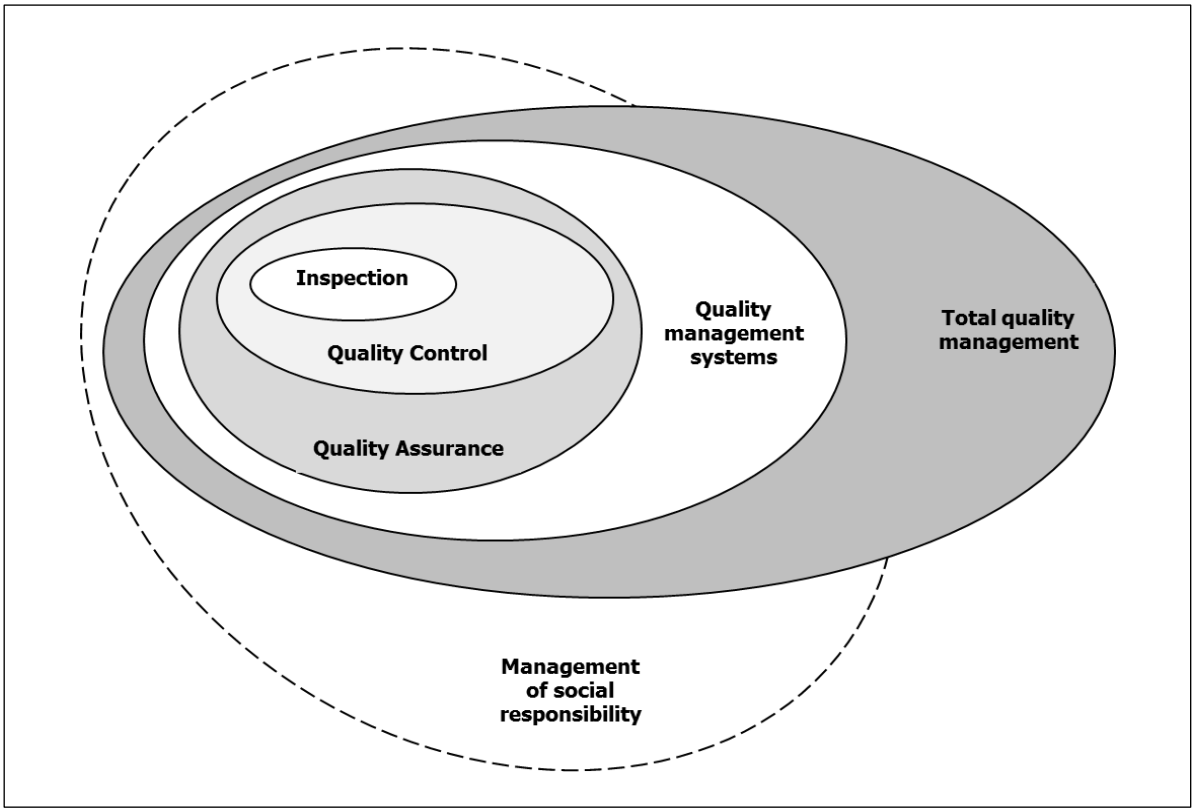
A quality management system (QMS) is defined in BS EN ISO 9000 (2005) as *a management system to direct and control an organization with regard to quality*. In this international standard, the rationale of certification to the QMS had been elaborated in detail and the consistent implementation of QMS may result in a high level of customer satisfaction (Sampaio et al., 2008; Weckenmann et al., 2015). The evolution and progression of a quality approach over the centuries had produced different domains for the management of quality that also correspond to the historical stages of quality (see Figure 2.2).

As the domain of quality changed over time to suit the need of global markets, van Kemenade (2014) summarised the development of QM through three paradigms – the control paradigm, the continuous paradigm and the commitment paradigm. The adoption to QMS has implied that the organisations willing to embrace all of those paradigms which focusing to the product, process and peoples along the supply

chain. The main reason is to increase competitiveness (Priede, 2012), particularly in labour-intensive manufacturing organisations (Moges Belay et al., 2012).

In the past few decades, QM was described as a discipline of management that is being practiced throughout the organization (Chuter, 2002). Dale et al. (2007) describe that QM implies that the organization is committed to produce the right product to the customer by utilizing the right raw materials, processes, machines, methods and by having adequate human resources to perform the job.

Figure 2.2 Domain of Quality (Jaccard, 2013)



According to Jaccard (2013), companies establish systems of QM evidently to portray their readiness toward competitiveness and the reliability of their products, components or services. He also stated that the implementation of quality management systems makes companies respond quickly to ongoing changes typically in volatile activities, product and services. Again, successful quality management requires a contribution from various departments in the organization toward achieving high-quality products.

2.7.2 QM in the RTW Garment Industry

QM has gained wide acceptance in the manufacturing sectors, yet the practices flourished across the globe (Pun and Jaggernath-Furlonge, 2009). The competition from less developed countries in terms of cost of the products have made QM as an important agenda for quality in apparel business (Lazibat et al., 2010). Some examples of practices of QM in the garment industry were studied and reported by Romano and Vinelli (2001), Fatima and Ahmed (2006), Chen et al. (2007), Chowdury et al. (2007), Norton (2007) and Hasan et al. (2013). Based on the findings from these literature, the awareness of quality exists and some of the QI activities are conducted to support a development of QMS in the organizations. However, the current practice and the level of implementation of QM varies amongst countries and organizations. Some organizations show a strong commitment and adopt several advanced quality activities, but others are slow in their attempt to adapt to quality environments notably in applying a basic quality control program. Chen (2005:275) in his research concludes that the QM along individual supply chains was classified into six major management procedures – design development, sample development & approval, fabrics & trim order and approval, bulk production management, shipping and warehouse management. Cooklin (2006) also states that most companies have their own quality system, but the implementation will differ depending upon the organization. Hence, at this situation the leadership principle is essential whereby the contribution from the top level of management are compulsory to develop and stimulate the quality culture in the workplace (Chowdury et al., 2007).

The implementation and monitoring of quality in the organization through the activities in the quality assurance (QA) and QC are often highlighted by different authors. Both terms are sometimes used interchangeably even though that they have different meanings (Burns & Bryant, 2007:122). The acronym QA is commonly used to reflect all planning and necessary actions made by the garment companies to assure customer requirement can be met by conforming to the standard and specification (Chuter, 2002, Glock & Kunz, 2005, Rosenau & Wilson, 2006 and Kadolph, 2007). Meanwhile, the term QC is referring to the process of quality checks and monitoring during the production of garments, typically in the garment assembly

process that take place in the organization (Burns & Bryant. 2007). Therefore, both terms are important components that may strengthen the company's QMS which will contribute to the quality of the finished textile product (Kadolph, 2007). It is also comprehensible that QA is a broader concept and has been widely used to indicate the whole quality management activities utilised by garment companies (Burns & Bryant. 2007). The easiest way to distinguish the applicability of both terms is to understand the main process occurs at both QA and QC as the part of the QMS.

2.7.3 Quality Assurance (QA)

In general, QA is defined as *a part of quality management focused on providing confidence that quality requirement will be fulfilled* (BS EN ISO 9000:2005). Dale et al. (2007) highlights the need to plan and prevent problems from occurring at source may lead to a lasting and continuous improvement in quality. This is based on the shift from mere detection of problems toward prevention of non-conformance. As such, QA from the perspective of Dale et al. (2007:28) is based on the following activities;

- Advanced quality planning
- Training
- Critical problem-solving tasks
- Improving the design of the product
- Improving process and services
- Improving control over the process
- Involving and motivating people

Kadolph (2007:6) defines QA as the process of designing, producing, evaluating and assessing products to determine that they meet the desired quality level for the company's target market. Similarly, Glock & Kunz (2005) use the term QA to portray the initiative of quality done by a company in order to implement the quality-oriented process in the preproduction, during production and postproduction. They stated that the process of QA involves activities in the product development, laboratory testing, inspection, statistical quality control (SQC), acceptance sampling, quality audits and analysis of returning merchandise. Tower and McLoughlin (2005) describe both QA and TQM activities as focusing on a proactive approach of prevention rather than a

reactive approach based on the detection of non-conforming product. By implementing a QA system and TQM, the process performance is monitored, any issues are investigated, and sustainable improvements are suggested.

Similarly, other authors (see Burns & Bryant, 2007; Rosenau & Wilson, 2007) also describe QA activities as listed by Glock & Kunz (2005). They stated that the process of QA must be considered from the very beginning of the product development cycle, and merchandisers should consider quality in their selection of raw materials, designs, fit, production specifications and finishing in the product line. This process definitely requires proper planning to ensure the consistency of quality can be achieved. According to Juran & De Feo (2010), planning for quality is essential before the execution of operations is one of the important elements in the process of QA. It is prevalent that the apparel firms use their QA activities to communicate with various customers by developing necessary documentations for each design and styles developed to be manufactured. As a result, adoption of a QA system enables the operations to be managed efficiently with the availability of documented processes as references among employees and departments (Chikuku et al., 2014). This is based on the phrase, 'Quality cannot be inspected into a garment, it must be manufactured into it' (Glock & Kunz, 2005:223). Indeed, quality of the final product is the result of all phases of manufacturing until the distribution process (Romano & Vinelli, 2001).

2.7.4 Quality Control (QC)

According to the BS EN ISO 9000:2005, QC is defined *as part of quality management focused on fulfilling quality requirement*. Gryna et al. (2007:171) refers to QC as the process employed to meet standards consistently. Meanwhile, Dale et al. (2007) view QC as an important measure to greater process control and a lower incidence of non-conformance. They also pointed out that the organizations whose approach of quality is based on QC are operating in a detection-type mode – means there are efforts to find and remove the defects before it goes to the next process. QC activities reflect the way quality is managed in a company, nonetheless the scope is limited, and the operational techniques are seen as only a corrective action approach for detecting and eliminating sources of defects (Matebu, 2006). The

reliance on QC for quality is mainly to conform to customer requirements (Anuar and Yusuff, 2011; Baral & Kifor, 2013).

The existence of the QC department in the garment industry is well known for the purpose of internal quality monitoring, examination and measurement of garments through a series of inspections. It covers different stages in the manufacturing process with a given specification and standard as agreed between retail buyers and manufacturers (Chen, 2005). Quality-conscious companies support the philosophy that all employees in the organization should practice the slogan 'do it right the first time' as they are expected to participate in identifying the causes of defects and proposing solutions of problems (Brown & Rice, 2001). According to Solinger (1988:562) in his 'Apparel Manufacturing Handbook', QC is the process of maintaining given standards in the product from the design phase to the consumer's use of the product. Chuter (1995) states that some of the modern writers began to use the term QA to describe a clearer picture on the process involved in QC. As a result, the QA concept has evolved to cover all the quality activities conducted from the very beginning of the product development process until the delivery stage of finished garments to the customers. This is because the QC activities tend to focus directly on the production process rather than on the quality commitment from the entire organization (Glock & Kunz, 2005).

Although QC is often regarded as a traditional quality approach in the manufacturing sector through different methods of inspection (Glock & Kunz, 2005; Burns & Bryant, 2007) the process is still considered important in the garment industry (Rahman, 2010). Both domestic and overseas production utilise QC activities to meet the quality standards. Nonetheless, lack of geographic proximity has rendered difficulties to monitor QC in the overseas production (Teng and Jaramillo, 2005; Yu & Lindsay, 2011; Goto and Endo, 2014). Maintaining good product quality at different global locations with cultural and languages barriers, different time zones and technology limitations have been huge challenges due to relocation of garment production into the low-wage countries (Teng and Jaramillo, 2005; Chen et al., 2007; Yu & Lindsay, 2011). Many international apparel firms send the garments to be produced to apparel contractors that are located in developing countries to achieve lower labour cost and supplies (Abecassis-Moedas, 2007; Varukolu & Park-Poaps, 2009) – labour

accounts for up to 50% of the final manufacturing cost of a garment (Lin et al. 2002). In addition, since the production of garment is classified as a labour-intensive industry, the reliance on the source of manpower to sew the garments in large quantities has forced the manufacturer to set up a QC department with the assistance of a group of trained quality inspectors.

Battini et al. (2010) reported that the trend of outsourcing and adoption of suppliers that own their production plants in developing countries has resulted in reductions in product quality. In the same vein, Yu and Lindsay (2011) added that lack of control over the overseas activities of garment factories can be the consequence of dealing with international sourcing. Furthermore, retailers or international buyers would approve the shipment of the final products based on the inspection results reported by the auditor (Mehta, 2004). According to these reasons, arguably, a comprehensive QC programme must be installed as a part of the system in the organization to ensure defects created along the production process are properly controlled and slowly reduced with the appropriate preventive action.

2.7.5 ISO 9000 Quality Assurance System

The ISO standards represent a worldwide phenomenon for implementing systematic QM in an organisation regardless of its size, product and sector (Ilkay and Aslan, 2012; Sampaio et al., 2012; Rogala, 2016). It provides a framework for organisations who need an initial plan and direction on the methodology for developing and designing an effective quality management system throughout the business operation (Poksinska et al., 2006). Being generic, despite a broad application of the ISO standards, the process of ISO implementation depends on size of the company, the complexities of manufacturing process, as well the existing quality programme (Matebu, 2006). Additionally, the adoption to a wide range of quality system standards and product specific standards were largely determined by the types of industry and final products as well a company's growth and development (Qiu, 2009).

ISO 9000 series quality standards were developed by the International Organization for Standardization (ISO) for facilitating international trade by establishing a common set of standards (Gryna et al., 2007).

According to Jaccard (2013:109), achieving certification to ISO 9001 quality management system requires the organization to fulfil the following objectives;

- an ability to provide consistent and regular production, as well as a product that meets the requirements of customers and stakeholders, and
- achieve customer satisfaction through the effective application of the system, including continual improvement of this system and assurance that the product conforms to customer and stakeholder's requirements.

Dale et al. (2007) states that the use of ISO 9001 standard ensures that an organization establishes a documented quality manual, procedures and quality records that are periodically revised based on the current needs from customers. Besides, it also guides the organization to monitor the defects, the corrective and preventive action are planned and implemented systematically, and lastly prioritizes the top management involvement by reviewing the system within the planned interval.

Dale et al. also (2007:288) outlines the primary ISO 9000 standards as follows:

- ISO 9000 – Quality Management Systems: Fundamentals and Vocabulary
- ISO 9001 - Quality Management Systems: Requirements
- ISO 9004 - Quality Management Systems: Guidelines for Performance Improvement
- ISO 19011 - Quality Management Systems: Guidelines on Quality and Environmental Auditing

Until the year of 2007, more than 100 countries were registered to use these standards as this registration enables them to compete and survive when dealing with both domestic and international markets (Gryna et al. 2007). Meanwhile, in the following year, Sroufe & Curkovic (2008) reported that more than 150 countries all over the world have achieved ISO certification to sustain the competitive advantage in their business in 2007. A few years later, a survey conducted by ISO in 2011 revealed that the demand for ISO certification by companies from different countries had been increasing steadily since the year of 2003 to 2011 whereby the total of 180 countries were actively registered with these standards (Jaccard, 2013). In 2012,

more than 1.1 million organisations worldwide were reported as ISO-certified according to the data collated by ISO (Rogala, 2016).

The international ISO 9000 standards was reported by Groocock (2000) to be the most discussed QMS in the quality literature as it also defines a QA system for numerous industries, including textile and apparel manufacturing. It has been reported that countries in developing nations have positioned ISO 9000 as a base for implementing TQM (Djerdjour and Patel, 2000). Therefore, accreditation to the ISO 9001 quality assurance system has become a major interest among garment companies in achieving a competitive advantage (Thaver and Wilcock, 2006; Sroufe & Curkovic, 2008). Evidence from case study companies in China carried out by Qiu (2009) indicates the manufacturers sought ISO 9000 registration due to a market pressure. Thaver and Wilcock (2006) report the compliance to quality standards has been an evaluation criterion for both domestic and overseas suppliers to achieve a reliable quality chain. Nevertheless, pursuing ISO registration soley for the purpose of marketing would not help the company to sustain the atmosphere of continuous improvement. Total commitment and dedication for all level of employees, notably from senior management are integral to obtain positive impacts from the ISO certification (Fatima and Ahmed, 2006; Matebu, 2006). Sroufe & Curkovic (2008) pointed out that the process of assuring quality cannot be achieved with an ad hoc basis initiative, but only when the QMS are well-implemented and maintained, can the organization be directed to meet their quality objectives. In their review of quality framework and standards, they found that many examples of significant improvement in quality resulted directly or indirectly from ISO registration.

Several authors have attempted to explain the reasons for companies to become ISO certified (Chen, 2005; Fatima & Ahmed, 2005:2006; Sroufe & Curkovic, 2008; Shafiq, 2012). The ultimate reason identified from those studies was related to a long-term business goal, so that customer satisfaction can be achieved and exceeded. Since ISO 9001 certification was often linked with the early steps of TQM implementation in organizations (Sarkar, 1998; Chen, 2005; Hakoma, 2007), many researchers have included the question about the status of ISO certification in their questionnaire as an indication of implementation of TQM. The study conducted by Towers & Mcloughlin (2005), Fatima & Ahmed (2005:2006) and Shafiq (2012) for

example, shows that the data regarding the status of QM were collated to understand the type of systems and standards the companies are currently using for quality management purposes. This is to discover how companies with accreditation in place, initiate and implement the quality activities for continual improvement.

The adoption of ISO 9001:2008 Quality management systems also led to a development of company's documentation system. According to Dreyfus (2004, cited in Hokoma, 2007) the process of ISO documentation can be described as document what you do, do what you document and record what you have done. In line with this, Shafiq (2012) states that the initiative of many textile companies to get certified with ISO 9000 indicates that they have the basic introduction of the QMS and have also developed the basic documentation for the implementation of QM concepts. Since the requirement to establish the appropriate documents and records is compulsory for ISO certified company, Santis et al. (2012) agrees the establishment of standardised procedural practices ensures the operations are performed efficiently with a systematic way of managing the documentations as well.

Nonetheless, the ISO certification solely does not reflect conformance to the systems most of the times. Some small and medium enterprises have been struggling to get certified to the standards due to extra paperwork and the cost of hiring specialists (Santis et al., 2012). Furthermore, Ingason (2014) reported the implementation of ISO 9001 was viewed as a project to accomplish with in a given time rather than a daily inherent process to achieve and sustain quality. In addition, the quality problems still exist (Budyansky, 2009; Yu and Lindsay, 2011). Moosa (2000, cited in Fatima & Ahmed, 2006b) generalises the ISO certified companies in Pakistan did not maintain the implementation of ISO requirements and the certification was providing transition to only quality assurance. After several years, a subsequent study by Fatima & Ahmed in 2006 showed that the ISO 9001 certified companies that represent Pakistan's knitwear and bedwear industry did not possess a good quality assurance programme. They also reported that some companies have used their ISO 9000 series of certificate only for the licence to penetrate the international market. Their study also empirically demonstrated a need of the garment industry to improve the common practice of QMS by adopting advanced QM concepts such as Kaizen, quality circles and TQM.

Similarly, Chen (2005) mentioned the quality issues that associated with misinterpretation of specifications, technical requirements and quality standards also occur in the China's garment manufacturing firms even the ISO 9002/ISO 14000 QA systems are operated effectively. He also highlighted the communication barriers are the main reason for the information delay and loss, even though the international standards have long been practiced in the firm. Arguably, based on the findings from Chen (2005), the effectiveness of ISO 9000 QA system which also known as preventive QM in the garment industry remains unclear. It was reported that although Chinese clothing manufacturers have adopted the ISO 9000 QA system, it would not reduce the cost of quality in terms of inspection, yet 100% inspection is still compulsory prior to shipment of goods to the customers. At this point of view, ISO registration was seen as a licence to do business at the level of domestic and the international market (Dale et al., 2007). Manufacturers should realise that the certification itself would not boost the company's performance, but it is the improved quality practices resulting from certification (Ilkay and Aslan, 2012).

2.7.6 Total Quality Management (TQM)

TQM in the perspective of today's approach of quality management is not something new but it still dominant and applicable in many industries (Evans and Lindsay, 2007). In addition, it has been perceived as a competitive strategy for global business (Ahire and Golhar, 1996) and one of the important inputs for world-class manufacturing (Brun and Moretto, 2014). Dale et al. (2007:30) simplifies the concept of TQM as a mutual co-operation of everyone in an organisation and associated business processes to produce value-for-money products and services which can meet and exceed the needs and expectations of customers. The TQM organisation directs all the activities in all of its departments to deliver quality products to various customers so that the business objectives can be achieved (Burns & Bryant, 2007; Kadolph, 2007). The implementation of TQM is definitely in place when all the employees are responsible for quality and understand their role and contribution for quality. Quality management has evolved from being driven by market pressure to being adopted because of the need to sustain high-quality products (Weckenmann et al., 2015). Hence, any activities that are conducted by the organization to conform the requirement of QMS may lead to the successfulness of TQM. The quality management system is one of the building blocks that help organisations to

implement TQM activities (Dale et al., 2007). Many agree that the adoption of ISO 9001 QA system would lead the company to embrace the TQM philosophy whereas it is based on people, product and process-oriented (Djerdjour and Patel, 2000; Hokoma, 2007; Sampaio et al., 2008).

According to Rahman and Tannock (2005) the acceptance of TQM concept among manufacturers in developing economies is still progressing as it was considered as a new and challenging management approach, notably involving some of the ASEAN countries. They stated that although it seems unclear on the most suitable strategies to practice TQM, many benefits can be perceived when TQM approaches are fully adopted with mutual understanding among all the members in the supply chain. Hokoma (2007) proposed organisations should strategically plan quality programmes and activities for implementing TQM which need participation from all employees. Although it is financially sound, the investment into these quality initiatives would provide positive outcomes to the future of the business (Tower and McLoughlin, 2005). However, to attain the desired outcomes, everyone in the organisation should be willing to change their attitude and upgrade their skills so that the aspect of prevention is given greater attention rather than detection (Tower and McLoughlin, 2005). When everyone is committed to pursue quality, the journey to TQM will be easier and can be practised effectively (Rahman and Tannock, 2005).

Massive publications from various text books and journals that covering a wider scope of research area shows that the concept of TQM is practicable in all business environments (Brown, 2013; Coleman, 2013; Zairi, 2013). Besides highlighting the role of quality control and quality assurance in managing the quality in the garment industry, the concept of total quality management (TQM) also gained a wide acceptance in the mid-1990s (Cooklin, 2006). Within 20 years, some authors have included a specific topic about TQM in apparel related text books (Chuter, 2002; Cooklin, 2006; Kadolph, 2007; Rosenau & Wilson, 2007) to indicate how relevance this modern quality approach in the apparel sector. In addition, the empirical evidences from the literature of the implementation of TQM in the apparel industry show the greater emphasis of quality amongst organizations (Fatima & Ahmed, 2005:2006; Chen, 2005; Towers & McLoughlin, 2005; Chowdury et al., 2007; Kapuge & Smith, 2007; Hasan et al., 2013). However, studies undertaken by Chen

(2005) and Fatima and Ahmed (2006) revealed that the position of TQM in the garment industry is still in uncertainty. The authors highlight the reliance on a series of quality inspections in the manufacturing process and the limited use of advanced concepts of QM have hindered efforts towards TQM implementation. A key element in TQM is that quality is built into the product or service; it cannot be inspected in or controlled (Kadolph, 2007:444). Thus, the continual efforts and attempts made by organisations to strive for excellent products and services through the application of TQM should be emulated by others for the aspect of improvement. This coincides with the statement written by Dale et al. (2007) that the QI should always be regarded as a never-ending process in the organisation.

2.7.7 Quality Improvement (QI)

QI tools are one of the key elements that lead to successful and effective quality management, by supporting and developing a process of continuous improvement (Dale et al., 2007). Basically, the tools can be used by all employees in the organization, regardless the departments and level of management. The purpose of these tools is to assist them to implement improvements based on the recorded data, the analysis done and the interpretation of the result (Kadolph, 2007). For this reason, Dale et al. (2007) points out when employees are using various tools and techniques, they have indirectly contributed to QI activities. Besides, it also encourages involvement and commitment among employees, building up a teamwork spirit as a quality culture in the organisation.

Drawing on an extensive range of sources, many authors have identified various analytical tools and activities used for improvement in the textile and apparel industry. Glock and Kunz (2005) view statistical quality control (SQC) as an important tool in garment manufacturing even though the concept has been introduced since the 1920s in Europe. SQC is the concept that has been applied in many textile and apparel companies whereby the inspection is conducted by randomly taking a specified sample of the entire lot and a decision to accept and reject the lot is made by the level of quality of representative samples taken out for inspection (Glock and Kunz, 2005; Kadolph, 2007). Chuter (2002) and Cooklin (2006) highlight the use of quality circles in helping to solve production-related problems. The quality circles were pioneered and flourished in Japan in 1960s

before this approach had been adopted by other countries globally. This mini project of quality consists of a team of four to ten people (Cooklin, 2006) and they work together to solve the selected problem that has been prioritized in the department or organization, without involving any cost to run the project.

Kadolph (2007) identifies various analytical tools such as the seven QC tools that consist of scatter diagrams, cause-effect-diagram, histogram, pareto charts, flow chart, check sheet and control chart for managing the numerical data, further analysis and interpretation for decision making. She also refers to the use of statistical process control (SPC) to identify and minimize unacceptable variations in a company's products and processes. Similarly, Rosenau and Wilson (2007) also point out the use of statistics and control charts through the application of SPC for the purpose of monitoring variations in the manufacturing process. According to them, having used the control chart to determine how stable is the product and process, the QC team are able to investigate the causes of any abnormal variation that might be due to the following factors;

- Training of machine operators.
- Machine failure or malfunction.
- Improper procedures.
- Use of improper materials.
- Poor working environment.

The actual practice and the effectiveness of those tools and techniques have been reported by a number of studies, typically among low wage countries for producing garments. A case study conducted by Romano and Vinelli (2001) who researched the Italian textile and apparel manufacturers, found that Pareto diagram, cause-and-effect diagram and check cards are extensively used to identify the reasons for any defects during production. Fatima and Ahmed (2005:2006) reveal that some of the garment manufacturers in Pakistan used the SPC, kaizen and quality circles to portray their practices for maintaining their quality management. The authors believe those quality improvement tools would give favourable impact on the garment manufacturing process and further propose the use of advanced QM concepts for Pakistan's garment industry. Meanwhile, Rahman et al. (2009) points out that 5-S and daily work management (DWM) are quality activities used by some of the

garment manufacturers in Bangladesh. Based on a case study in the trouser manufacturing company conducted by Brad and Brad (2010) in Austria, they note that the company has utilised the seven QC tools by analysing data using a pareto chart, cause-and-effect diagram and control chart as the problem-solving tools in the production process. Additional empirical evidence of using QC tools in garment manufacturing was reported by Ahmad et al. (2013) and Islam et al. (2013). They highlight the importance of using a check sheet, pareto diagram and cause-and-effect diagram to help the QC and production team make a proper analysis of any quality problems. The use of these tools also assists them to take necessary corrective and preventive actions to control and reduce the sewing defects. Both studies were conducted in Bangladesh and India.

Other examples of the effectiveness of quality tools amongst textile and clothing manufacturing in Brazil were reported by Santis and Scopinho, as well Rocha Kachba et al. in 2012. Santis and Scopinho (2012) demonstrate the use of SQC, histograms, flow charts and Plan-Do-Check-Action (PDCA) cycle for process improvement in a small textile industry of knitting. Rocha Kachba et al. (2012) defines quality tools and methods used in the organization as tactical quality management. They reported that some textile and clothing industries have successfully adopted seven QC tools, quality circles, PDCA and kaizen towards better quality of their end products. A recent study by More and Pawar (2013) proposes the integration of QMS and six sigma as a Quality Six Sigma (QSS) in the Indian textile industry. They also suggest this new concept can bring an organization to a new dimension of managing quality in the manufacturing sector, which can lead to performance improvement in the textile and apparel industry. Thus, according to the previous study, it is reasonable to assume that the QC tools are the most common tools for improvement in the garment industry and are proven to help the production and quality team to take appropriate action towards continual improvement. Based on above-mentioned cited literature, manufacturers used the suitable tools to help them in recording and analysing the data received from the manufacturing process before making an appropriate decision to control the quality of products. The basic tools for instance are suitable for people with little knowledge in statistics but the formal training and experiences of using the tools will definitely

help the employees to enhance their skills in order to analyse and interpret the company's data efficiently (Lazibat et al., 2010; Zhang et al. 2014).

Although the quality philosophers preached the use of QI tools with the emergence of advanced concept and strategies to align with the modern business operation, not all tools were found applicable and suitable to be used in the manufacturing industry. Despite the positive impacts these tools could bring to an organisation, the readiness to adopt with these QI tools among the manufacturing companies is questionable, notably in the labour-intensive manufacturing industries (Fatima and Ahmed; 2006; Yusof et al., 2015). In order to implement any QI tools, senior management should initiate and consistently be involved in any of quality programmes (Fatima and Ahmed, 2006; Chowdhury et al., 2007). There must be a concrete reason to adopt any of the QI tools and the senior management should be committed to their decision and come out with a reliable action plan. A key person who has a comprehensive understanding of the tools should be appointed to guide other employees in achieving the desired results. Without having appropriate knowledge, skills and knowing the exact aims to be fulfilled, it will definitely lead to an unsuccessful attempt to pursue quality and make the journey to quality harder to maintain.

2.8 Control Systems Quality Management in the Garment Industry

2.8.1 Quality Inspection for the Mass-produced Garments

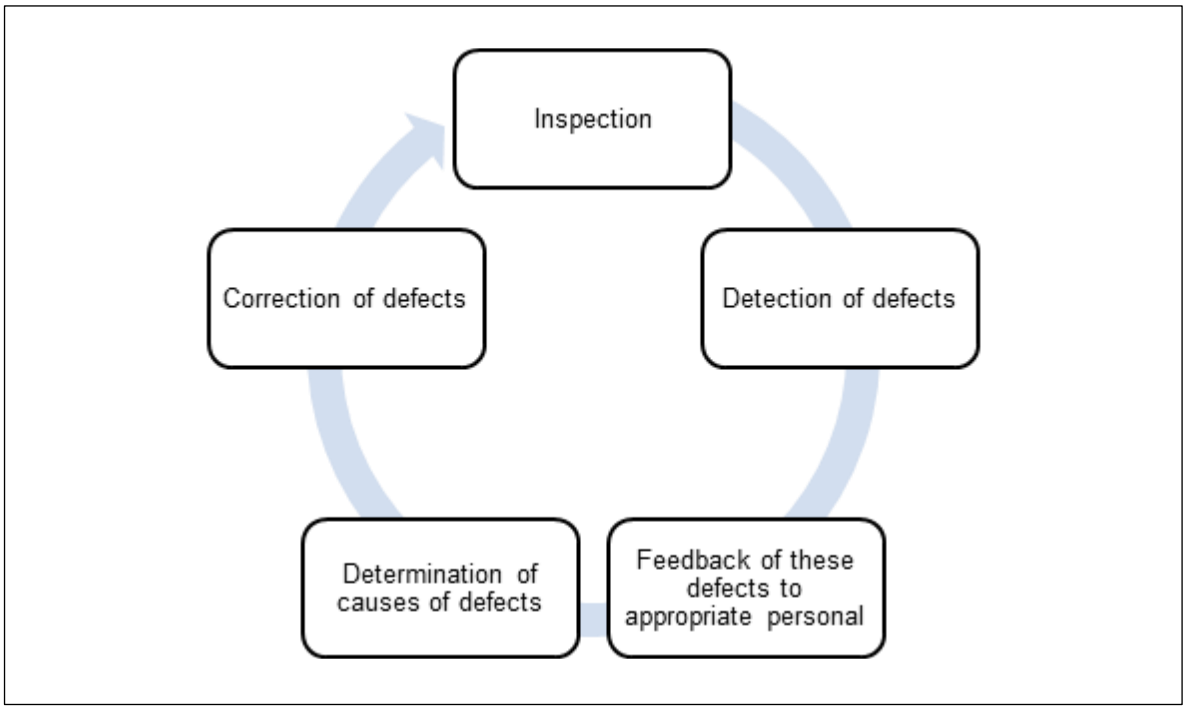
The term inspection usually refers to the manufacturing industries (Gryna et al. 2007). In the manufacturing environment, the inspection is not only applied to the manufactured components and assemblies until the finished products are sent to the warehouse, but it must also begin at the stage of incoming materials (Dale et al. 2007). Kadolph (2007:365) defines inspection as the visual examination or review of materials, product components, and finished products on the basis of their adherence to some established set of standards, specifications and requirements. It is also a part of formal evaluation designed around the production worker, besides self-control and auditing process (Juran & De Feo, 2010). Gryna et al. (2007:467) list the following purposes of inspection:

- to distinguish between good and bad product

- to determine whether the process is changing
- to measure process capability
- to rate product quality

In short, the main reason of the inspection in manufacturing is simply known as conformance to specification (Glock and Kunz, 2005; Dale et al. 2007; Gryna et al. 2007). Generally, the principle involved in the inspection process is not complicated (Kadolph, 2007). The step by step process to achieve an effective inspection is summarised as according to the diagram of the inspection loop for the effective inspection as shown in Figure 2.3.

Figure 2.3 Inspection loop (Kadolph, 2007)



According to Pesante-Santana and Woldstad (2006), one of the main types of quality inspection is known as sensory inspection which means the reliance to human senses to evaluate the product's qualitative characteristics. Hence, the role of quality inspectors to judge the quality of products in all stages of manufacturing is deemed important. Usually, the task is carried out by inspectors whom also can be amongst machine operators, team quality auditors, plant supervisors or quality auditors appointed by the buyer or contracting party either from manufacturer or retailer

(Burns and Bryant, 2007). Inspectors are trained to perform the inspection (Chuter, 2002) and the individual traits or attributes such as knowledgeable, good attention to detail, thorough, good communication skills and also good eyesight and colour perception are those several desirable characteristics that could help the inspector to conduct an effective inspection (Chuter, 2002; Kadolph, 2007). In addition, real time experiences in the process of inspection assist the inspectors to develop skills in assessing the quality of products (Oana et al. 2013). Although the inspectors can be identified as 'police' in the factory,they should co-operate very well with the production supervisors in order to maintain the process of inspection effectively (Kadolph, 2007),.

Inspection in reference to quality control in the apparel industry often includes a visual examination of fabrics, button, zippers, sewing thread, trims, a physical check of the product dimension and measurement of partially finished components of the garments and completely finished garments in relation to customer requirement and an established quality inspection standard (Kadolph, 2007; Rahman, 2010). Rosenau and Wilson (2007) add that visual inspection also includes spreading of the materials before the cutting operation takes place. The considerations such as on-grain garment parts and dye lot colour matching during spreading and cutting must be monitored carefully (Burns and Bryant, 2007).

Mr. Colin Barr, the Managing Director of Colin Barr and Associates in Scotland, UK group (cited in Anthony, 2013:679) highlights that many organisations still view the quality department as merely the inspection and compliance. Garment inspection is the main process in the quality department and some companies either use the term quality control (QC) or quality assurance (QA) department to lead the inspection process. Glock and Kunz (2005:214) report that the inspection process remains as the most frequent type of quality control in apparel plants based on the study conducted by Bobbin magazine. Other empirical studies have provided a similar input which involved the countries where the manufacturing of garment often took place typically in developing countries such as in China, Pakistan, Ethiopia and Bangladesh (Chen, 2005; Fatima and Ahmed, 2006; Matebu, 2006; Rahman, 2009). Therefore, it is understood that quality inspection remains significant in the apparel sector, even though the adoption of advanced technologies has become an indicator

for manufacturers to achieve competitiveness in the global market (Vorukulu and Park-Poaps, 2008).

2.8.2 The Importance of Quality Inspection in Garment Manufacturing

In each garment factory, a thousand pieces of garment parts and complete garments are sewn and produced everyday by the sewing operators (Gunesoglu & Meric, 2006). Due to this situation, it seems impossible to monitor and control the quality of each piece of garment. When it comes to the large-scale of garment production, many sewing operators are involved to produce the garment from the first operation of joining the garment parts until the last operation and they are usually managed into assembly lines (Dillard & Schwager, 1997). A limited practice of self-control among the sewing operators has made the quality inspection crucial in the garment industry.

The garment inspection appears to be the last effort at the level of manufacturer to ensure there will be no defective garments when customers receive their order. The study conducted by Soltani et al. (2011) reveal that the company who manufacturers the products must be responsible for all quality aspects of production, and there is no option to escape from this responsibility. Moreover, current global competition has forced apparel manufacturers to impose tighter quality monitoring process to assure the customer requirement can be fulfilled and exceeded. Despite reasons that have been provided, there are other issues highlighted by some of authors based on their experiences and investigations to explain the importance of quality inspection in garment manufacturing. Brown and Rice (2001) draw on the issue of piece-rate wages received by sewing operators in their daily job. Based on this system, they are paid according to the number of pieces they complete rather than by the hour and the rates are determined according to the length of time for sewing operation. Although sewing operators become highly motivated to complete the sewing task, they tend to work rapidly than to work accurately (Brown and Rice, 2001:67). When pay is based on the quantity of work, sewing operators tend to work very fast and not encouraged to sew perfectly (Kadolph, 2007). In this situation, in-line inspection or roving inspection (Rosenau and Wilson, 2007) is conducted by QC inspectors, so that the performance of sewing operators can be monitored during production and any defects found can be repaired or removed before it goes to the next operation.

Walter et al. (2009:117) provides the scenario of communication and collaboration problems imposed on teams of individual located in different places, with different roles, background and skills due to complexity of globalization operations along the supply chain. The problem occurs because most of production of garments is offshore, typically in the low wage countries for the cheap labour cost and supplies. Without a proper and consistent quality inspection, the standard and specification can be interpreted wrongly by sewing operators and thereby it may lead to an influx of rejected garments which are not following the specification. The same issues already highlighted by Chen (2005) and Yu and Lindsay (2011) in relation to the international outsourcing in the clothing supply chain.

Gunesoglu and Meric (2007) list factors such as properties of fabrics and human emotion that may affect the workers performance, thereby cause variance in the process. Glock and Kunz (2005) and Islam et al. (2013) also highlight the same situation that even with 100% inspection, some defective garments may be shipped to the customer. Similarly, Rosenau and Wilson (2007) report the same issue that may occur in the production whereby the defects still can be found even when the instruction and specification is followed by the sewing operator. Schafer (2011) adds that almost 30 percent of defects can be missed due to the errors made by inspectors. Thus, in order to control this situation, garment inspection must be performed as long as a human and mechanical error might happen during the sewing process (Glock and Kunz, 2005).

2.8.3 Method of Garment Inspection

Cooklin (2006) states that the companies will establish different practices of quality system – thus he mentions there is no single system of quality control that is best for all clothing factories. This is including the methods of garment inspection during the production process, finishing and before shipment proceeds to the customer. The method of garment inspection can be very comprehensive and detailed for some companies, while other companies use simple QC procedures based on the types of end products, customers and where is the destination the end products will be shipped to.

Many scholars in textile and apparel elaborate different types of inspection used in the garment manufacturing sector and it includes the raw material inspection, in-

process inspection and also the final inspection (Brown and Rice, 2001; Glock and Kunz, 2005; Cooklin, 2005; Rosenau and Wilson, 2007; Rahman, 2009). Some of them even used the specific terms for each inspection that probably had been a practice in certain garment companies (Chuter, 2002). Although there are many terms have been used by the scholars to explain how the inspection is performed in the garment industry, it would indicate that the quality control activities through a series of inspections have been standard practice amongst all manufacturers. Based on different types of inspection highlighted by scholars, most methods of inspection used by the manufacturer are fabric inspection, in-process inspection and final inspection. These inspections are prevalent activities for companies that receive orders from customers and do their own sourcing for the raw material from various suppliers (Glock and Kunz, 2005). When the material arrives, particularly fabrics, the fabric inspection is performed to check the quality of the fabrics before it then is sent to the cutting process (Mehta, 1999; Glock and Kunz, 2005; Burns and Bryant, 2007; Rosenau and Wilson, 2007). It is compulsory for them to determine the quality of materials supplied by different suppliers as the fabric defects sometimes would give problems to the following process in the garment production (Glock and Kunz, 2005; Kadolph, 2007). If the quality of raw materials is not monitored and controlled by the manufacturer, poor-quality garments are created at the early stages of manufacturing even before production begins. The quality-conscious companies will put an effort to make sure the quality level of materials they received are fulfilling their specification by conducting the inspection, so that any further action can be taken promptly if the quality of materials is not what they expected from suppliers (Rosenau and Wilson, 2007).

When production begins, the sewing process appears to be critical whereby each design approved by the customers are produced in large quantities by the sewing operators. As the sewing process is involving many workers with different skills and capabilities, as well different sewing machines that function differently (Islam and Shazali, 2011) inspections must be carried out to control any defects that occur during the process of manufacturing. The detection of major and minor defects at the early stage may prevent the possibilities of rework and repairs (Brown and Rice, 2001), so that, time and money is not wasted for non-value-added activities (Ahmed et al., 2013; Islam et al., 2013). At some situation, when the defects are found after

the garments are completely sewn by the sewing operator, time will be wasted for the sorting activities (Islam et al., 2013). Despite the above-mentioned methods of inspection which are performed by human inspectors, it seems impossible to adopt automated inspection systems for garment inspection as Pesante-Santana & Woldstad (2006) state that the limitation is in classifying the decision into acceptable or rejectable status.

2.8.4 Inspection procedures in the Sewing Assembly line

The sewing process is the main operation in the production of garments and it involves the joining of garment parts from the first operation until complete garments are produced. In that case, the focus of QC in the sewing process is vital to ensure the garments are produced according to production and measurement specifications. The quality of the garment parts usually will be inspected at random by the QC inspector from each operator. As a result, any sewing faults detected will be notified to the operators either it can be corrected immediately or require an additional follow-up for preventive action (Rosenau and Wilson, 2007).

Inspections that are conducted in the sewing assembly line are known by many names, such as in-line inspection (Brown and Rice, 2001; Chen et al., 2007), in-process inspection (Mehta, 1999, Glock and Kunz, 2005; Burns and Bryant, 2007; Kadolph, 2007; Rosenau and Wilson, 2007; Rahman, 2009; Necef and Ondogan, 2013), du-pro inspection (Kadolph, 2007), roving inspection and stationary inspection (Chuter, 2002; Rosenau and Wilson, 2007). During assembly, basically the QC inspector will evaluate each inspector's work by inspecting the garment parts that are sewn by operators as according to the particular bundle (Rosenau and Wilson, 2007). Usually, the inspector works among the sewing line, but in some cases the inspection is established at various inspection points (Mehta, 1999; Brown and Rice, 2001). Chuter (2002) explained about garment parts that are brought to the inspector for inspection by conducting a centralized inspection or stationary inspection, the term used by Rosenau and Wilson (2007).

The number of garments inspected might depend on the company's inspection standard and procedure, but commonly the random sampling or statistical sampling plan will be used to indicate the number of garments to inspect (Mehta, 1999; Glock and Kunz, 2005; Kadolph, 2007; Rosenau and Wilson, 2007). According to them, the

acceptance quality limit (AQL) is often referred by the manufacturer, whereas it is a statistical approach used to determine the quantity of garments to be examined. However, it is considered optional to use AQL-based sampling in the stage of the sewing process. Brown and Rice (2001), for instance, mention that AQL-based sampling is used in the last type of quality inspection, which is final inspection. As reported by Chen et al., (2007), some garment manufacturers in China have used the AQL only for the final inspection, as the same as the findings reported by Rahman et al., (2013) about the garment manufacturers in Bangladesh, whereas the AQL 2.5 is only used on the stage of finishing. Nonetheless, if the inspection is done based on the AQL sampling, the garments will be taken out randomly from the bundle according to the AQL agreed by the manufacturer and buyer. If too many major and minor defects found from the selected garments, which exceed the allowable defects specified in the AQL, all garment parts in a bundle must be inspected (Mehta, 1999; Brown and Rice, 2001; Glock and Kunz, 2005), otherwise the quality of garment parts is considered acceptable.

2.8.5 Final Inspection for Finished Garment

Chuter (2002:51) in his book of Quality Management in the Clothing and Textile Industries mentions that *we cannot let defective garments pass to our customers*. His statement is still relevant in today's context since most companies do not let the end products to reach the customer without going through the process of final inspection. The buyer also may refuse to approve shipments that do not pass the final inspection (Glock and Kunz, 2005; Kadolph, 2007). In addition, Lee at al., (2013) draw attention to the uncertainty of product quality in the level of manufacturer prompts the retailer to conduct the final inspection before accepting the bulk orders. This is to ensure the manufacturer is able to comply customer requirements before the bulk orders is approved for shipment.

Inspection is continually being performed to ensure the quality of the end products is assured by looking at the aspects of construction, size, measurement and appearance of the garments (Burns and Bryant, 2007; Kadolph, 2007), right after the garment is sewn completely by the sewing operator. Final inspection may take place before and after the packaging process and also after the order reaches customers (Rosenau and Wilson, 2007), depending on the buyer requirement (Solinger, 1988).

Brown and Rice (2001) mention about the process of trim and inspect, whereas the quality of finished product is checked 100 percent by a group of inspectors. At this point of inspection, the inspectors will trim any excessive threads missed by the sewing operators and any defective garments found are sent back to the sewing section for immediate corrective action. The need to engage in 100 percent final inspection for the finished garments is due to the minimal in-process inspection during production (Kadolph, 2007), even though it is defined as a conservative approach (Schafer, 2011). However, inadequate control during production is contradict with findings provided by Chen (2005) and Yu and Lindsay (2011). Chen mentions even though the companies have utilised stringent process control during production with quality assurance system in place, 100 percent check for final inspection still been carried out to assure product conformities. Furthermore, Yu and Lindsay (2011) add that some buyers are confronted with unexpected quality issues, although they have provided to their overseas suppliers a clear instruction and manufacturing requirements, including people to the factory mostly during peak seasons to help monitor the quality of production. In considering these situation, reasons stated by Battini et al, (2012) could lead understanding of this issue. According to Battini et al., (2012), although checking all items may increase the total inspection costs, the manufacturer is still willing to do it in order to eliminate any penalty costs incurred due to non-conformance products sent to the customers. The penalty costs resulting from scrapping and replacement of defective items would tarnish manufacturer's reputation in supplying good quality products to the global market. Therefore, it seems that the manufacturer will implement any effort to ensure only conforming products may be delivered to the customers, even though the cost is higher than any other inspection (Mehta, 1999).

Although Brown and Rice (2001) have used the term 'trim and inspect', other scholars (Chuter, 2002; Glock and Kunz, 2005; Cooklin, 2006; Kadolph, 2007; Necef and Ondogan, 2013) also demonstrate the same inspection procedures for the finished garments by conducting a 100 percent inspection system. However, not all companies have used the 100 percent inspection, some of them, preferably use statistical sampling based on the AQL and some companies tend to use both (Glock and Kunz, 2005). The findings from several studies show that the garment manufacturers are using the AQL-based sampling for the final inspection or final

audit. According to Chen et al. (2007), the AQL-based sampling is used by the Chinese garment manufacturer for the final inspection. He states that it was the requirement for the UK retailers to perform the inspection based on the AQL 2.5 before the shipment is approved and the inspection is conducted by the retailer's QC. The same inspection practice is also implemented by garment manufacturers in Bangladesh. This is based on the findings gained from the study conducted by Rahman et al. (2009), that the final inspection of finished garments is performed based on AQL 2.5 as according to the requirement of the buyer. The inspection is carried out in the presence of buyer or retailer representative or QC and the inspection is commonly known as final audit. Another study conducted by Baral and Kifor (2013) in Bangladesh report that the defect percentage decreases when AQL 1.5 is used for garment inspection, instead of AQL 2.5. It indicates the sewing operator tend to make less mistakes and be more alert when the manufacturers impose stringent quality requirements. As a result of these studies, it seems reasonable to assume that the requirement for the final inspection either to use the statistical approach or 100 percent sampling for inspection is determined by the customers who order the finished garments. This is reflected in the quality requirement demanded by the international firm that liaise with offshore garment producer (Dana et al., 2007).

2.8.6 The Uses of Sampling Plan for Garment Inspection

SQC is described as a reduction of the amount of goods taken in the inspection, thus the interruption in the production flow can be minimized (Glock & Kunz, 2005). Chuter (2002) provides his view about the occurrence of major and minor defects in the production lot that often vary with time based on the root cause of the problem. Therefore, it is common when the statistical technique is used to determine the sampling rules and make a prediction about the quality of the entire lot based on the representative samples that were taken. In the garment manufacturing sector, garments are mass-produced in assembly lines. Thus, makes the inspection process by statistical sampling to be a common QC activity for the purpose of monitoring the quality during production and post-production. This process is usually referring to the

method of ‘acceptance sampling’ and it is recognized as the important field in the implementation of SQC (Bheda, 2004).

According to the international standards of BS ISO 3951-2 (2013:2) and BS ISO 3534-2 (2006:17), the term acceptance sampling is defined as a *sampling to determine whether or not to accept a lot, or other amount of product, material and services*. For this reason, instead of inspecting all pieces of garments in a lot, a random sampling or statistical sampling plan is used, where a representative sample is inspected rather than the entire lot (Mehta, 2004; Kadolph, 2007; Baral & Kifor, 2013). Shmueli (2011) describes acceptance sampling as based on the concept of probability, allowing the conclusion about the level of quality of a particular lot or batch to be reached with a given certainty level. In her hands-on guide of acceptance sampling book (2011:13), she provides an example to explain what acceptance sampling is by stating that *we are 95% certain that the percent of non-conforming items in the entire batch is no more than 1%* when any of sampling plan is chosen for inspection. Based on the inspection result, the quality level of the lot can be determined by only inspecting the representative of samples – therefore it enables the decision to be determined whether a batch or lot of product items should be accepted or rejected (Mehta, 2004).

Acceptance sampling is not only practical to be used in the garment industry, but it is also applicable in various manufacturing processes from different industries (Deros et al., 2008; Shmueli, 2011; Dumiĉić & Žmuk, 2012). The major reason and ultimate goal of acceptance sampling is to avoid 100% inspection (Mach & Duraj, 2007). In the textiles and apparel sector, numerous authors (Chuter, 2002; Mehta, 2004; Glock and Kunz, 2005; Kadolph,2007; Rosenau and Wilson, 2007) have explained the purpose, method and procedures of using acceptance sampling for inspection during the production process. According to Mehta (2004) in his book ‘Quality Assurance for Retailers’, acceptance sampling or statistical sampling is applicable in the various stages of the garment manufacturing process. In the same vein, Kadolph (2007) and Shmuelli (2011) also state that the acceptance sampling is deployed for inspection during the manufacturing process in the apparel industry. Glock and Kunz (2005) highlights that the use of acceptance sampling may upgrade the inspection job amongst inspectors in the aspect of decision making, whereas the decision to accept

or reject the entire lot should be determined by only inspecting the random samples from the lot. Nonetheless, the decision to use either statistical sampling or 100 percent inspection still depends on the organisation products whereas the cost of quality may be taken into consideration (Chuter, 2002; Mehta, 2004; Kadolph, 2007), even some might use it due to the safest method (Rosenau and Wilson, 2007). Under certain circumstances, 100 percent inspection is considered ineffective to be conducted in the factory due to the inspection cost incurred by a manufacturer that may include the time allotted for the inspection and the number of inspectors needed to perform the inspection (Solinger, 1988; Glock and Kunz, 2005, Gryna, 2007; Rosenau and Wilson, 2007). In addition, the 100 percent inspection is also regarded as monotonous and may cause inspection errors (Gryna, 2007). Therefore, the sampling procedures are the best option to replace 100 percent inspection notably in the production of low cost garments in the market.

The process of selecting items from a production lot for inspection is referred to as sampling or taking a sample and usually is drawn at random. A sampling plan describes how to select a reasonable number of products to represent the product unit or lot based on color, size, style and other important dimensions (Kadolph, 2007; Rosenau and Wilson, 2007). Sampling plans that are typically used for the garment inspection is known as sampling plan for attributes whereas the property that is being measured is classified either pass or fail based on the specification provided by the manufacturer of buyer (Gryna, 2007; Shmueli, 2011).

2.8.7 The Types of Sampling Plan

The literacy of deploying acceptance sampling for inspection amongst quality control personnel in the organization is meaningless without an adequate knowledge of the sampling plan chosen and the reason of using it (Shmueli, 2011). There are different types of acceptance sampling procedures can be used for inspection, which are known as single, double and multiple sampling (ANSI/ASQ Z1.4-2003). When the single sampling plan is used for inspection, the quality of representative samples drawn will deduce the quality level of the entire lot based on a single sample (Chuter, 2002). It indicates that if more than a given number of defects are found, the lot is rejected. However, if less defects are found, the lot is accepted. Based on this type of sampling, it seems that this approach is the most economical way to perform the

inspection (Solinger, 1988) but the result may not be conclusive (Chuter, 2002). Necef (2013) reports that for the sample preparation as a part of product development process, the single sampling plan is used for the fabric inspection, while 100 percent inspection is used for the finished samples to ensure the garments are free from defects before it will be presented to the potential buyers. In double sampling, the procedures of taking a sample are performed twice, depending on the quality level of the first inspection. According to Solinger (1988), there are two given numbers of defective units in this double sampling plan. If the number of defects found fall between the upper and lower limit of acceptance and rejection number, the second sampling of inspection must be carried out to achieve the actual level of quality of that particular batch or lot. Mehta (2004) added that by using double sampling plan, suppliers are offered a second chance to prove the lot is not as bad as resulted from the first sampling inspection. Despite of having an extra representative sample for inspection, which indicates the actual quality of the entire lot if the first inspection is rejected, this procedure requires more than once decision – yet it's also a lengthy process. Similarly, the multiple sampling also is using the same procedure as a double sampling. However, the additional samples are taken more than two times from the same batch until the final decision about the quality of a particular batch or lot inspected is achieved (Chuter, 2002; Gryna, 2007). Thus, it may seem that any sampling plan used for inspection can be either an advantage or disadvantage for companies that use it.

In the real application for inspection, single sampling plan is the most chosen procedure compared to double sampling for acceptance decisions (Bheda, 2004; Atilgan, 2007; Deros, 2008; Dumiĉić & Žmuk, 2012) and acceptable quality level (AQL) always been referred to indicate a specific level of product quality (Pearn and Wu, 2007) in the inspection process.

2.8.8 Acceptance Quality Limit (AQL)

In section 3 “Terminology and definitions” of ISO 2859-1, AQL is written as:

“Quality level that is the worst tolerable process average when a continuing series of lots is submitted for acceptance sampling”.

Either the term used is known as *acceptable quality level* or *acceptance quality limit*, AQL has been referred for the sampling procedures in the garment inspection process. AQL presents a poor level of quality for the vendor’s process that a consumer would consider acceptable as a process average (Pearn & Wu, 2007). AQL also has been defines as the maximal percent of nonconforming items, which is considered, for inspection purposes, as satisfying process mean (Mach & Duraj, 2007). Those definitions are related to the AQL defined by Mehta (2004:52) that describes the AQL as *the maximum percent defective that for the purpose of sampling inspection can be considered satisfactory as a process average while using ANSI/ASQC Z1.4 or ISO 2859-1 sampling plans.*

When AQL is used for inspection, the inspector will be able to figure out the quantities of the representative samples need to be randomly pulled out of the lot. The inspector need to refer to the AQL table for the sampling procedures which conform to ANSI/ASQ Z1.4-2008. The standard that is developed for the sampling procedures and tables for inspection by attributes is identical with the 2003 version and the same with the procedures and tables contained in the MIL STD 105E which had been obsoleted in 1995 (Bheda, 2004; Glock and Kunz, 2005; Kadolph, 2007). According to Glock and Kunz (2005), when the lot size, an AQL and the sampling plan is known, the sample size for the inspection can be decided by using the table 2.1 and 2.2 as exactly available in the standard.

Table 2.3 Sample Size Code Letters

Lot or Batch Size			General Inspection Level		
			I	II	III
2	**to**	8	A	A	B
9	**to**	15	A	B	C
16	**to**	25	B	C	D
26	to	50	C	D	E
51	to	90	C	E	F
91	to	150	D	F	G
151	to	280	E	G	H
281	to	500	F	H	J
501	to	1,200	G	J	K
1,201	to	3,200	H	K	L
3,201	to	10,000	J	L	M
10,001	to	35,000	K	M	N
35,001	to	150,000	L	N	P
150,001	to	500,000	M	P	Q
500,001	and	over	N	Q	R

Source: ANSI/ASQ Z1.4 The Sampling Procedures and Tables for Inspection by Attributes (2008)

In Table 2.3, when the lot size is known to determine the sample size code letter for inspection, it is advisable to always refer to the general inspection level II (Gryna, 2007) that indicates a normal inspection. Bheda (2004) states that the garment industry generally uses the normal level of inspection. Once the code letter is obtained, the sampling procedure can be read from the Table 2.4 to begin the sampling and inspection process. Nonetheless, Table 2.4 is used for the single sampling plan procedure. The decision whether to accept or reject the lot is depending on the AQL that has been set up by the manufacturer or buyer.

Table 2.4 Sampling Plans

Sample Size Code Letter	Sample Size	Acceptable Quality Level (AQL) for normal inspection									
		1.0		1.5		2.5		4.0		6.5	
		Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re
A	2	0	1	0	1	0	1	0	1	0	1
B	3	0	1	0	1	0	1	0	1	0	1
C	5	0	1	0	1	0	1	0	1	0	1
D	8	0	1	0	1	0	1	1	2	1	2
E	13	0	1	0	1	1	2	1	2	2	3
F	20	0	1	0	1	1	2	2	3	3	4
G	32	0	1	1	2	2	3	3	4	5	6
H	50	1	2	2	3	3	4	5	6	7	8
J	80	2	3	3	4	5	6	7	8	10	11
K	125	3	4	5	6	7	8	10	11	14	15
L	200	5	6	7	8	10	11	14	15	21	22
M	315	7	8	10	11	14	15	21	22	21	22
N	500	10	11	14	15	21	22	21	22	21	22
P	800	14	15	21	22	21	22	21	22	21	22
Q	1,250	21	22	21	22	21	22	21	22	21	22

Source: ANSI/ASQ Z1.4 The Sampling Procedures and Tables for Inspection by Attributes (2008)

The retailer or buyer will designate the specific value of AQL which indicates their acceptance of percent defective from the lots or batches produced by the appointed supplier (Mehta, 2004). The lot is accepted if the defective pieces are less than allowed number, but the lot is rejected if the more the defective pieces are greater that allowed. Mehta (2004) gives input that the AQLs of 2.5, 4.0 and 6.5 are widely used for soft line and hard-line merchandise typically in the retail industry. Chen et al., (2007) and Rahman (2009) provides the real practices through a case study of several garment manufacturers in China and Bangladesh which have utilized AQL 2.5 for the garment inspection before the finished garments are shipped out to customers. According to the Table 2.2, the higher the value of AQL, the lower the

accepted quality level. Some garment manufacturers tend to use different AQL's for defect classification as the way to control different types of defect. As reported by Mach & Duraj (2007), it is common to use an AQL of 1% for major defects, and up to 2.5% for minor defects.

2.8.9 AQL-Based Sampling for Garment Inspection

In the export market of garment industry, the use of AQL-based sampling is a common practice for the garment inspection as agreed between manufacturers and their buyers (Bheda, 2004; Baral & Kifor, 2013), even though it is considered as a traditional way of conducting an inspection (Rosenau and Wilson, 2007). Usually, the international buyers established a QA system which includes the inspection procedures and guidelines from the stage of fabric inspection until the final inspection of finished garment, either it will be performed by the internal QC or an independent agent appointed by the buyer (Rosenau and Wilson, 2007). The AQL-based sampling is used to indicate that the lot or batch ordered by them from the respective supplier is not contained defects garments which they could not be able to tolerate with. Although the manufacturer is responsible for all the resources in the factory such as machines, materials, methods and man to manufacture the garments, the retailer or buyer seems to dictate the quality of the end products by designates and set the fix AQL for their own brand. By letting the manufacturer knows their AQL, the buyer seems to guide and control their supplier from far. This is to ensure the overseas supplier is capable to produce products as according to customer specification.

The AQL-based sampling is the straight forward process unless the person in-charge of quality is not trained to understand the sampling plan from the AQL table as according to the standard of MIL-STD 105E or ANSI/ASQ Z1.4. Basically, when any bundle is chosen for inspection during the production, the inspector will randomly take out few pieces of garment parts or complete garments based on the sample size as required according to the AQL table. The inspector will conduct the inspection by checking of certain parameters as to fulfil the garment specification developed by the designer or Merchandiser (Glock and Kunz, 2005; Kadolph, 2007). The major and minor defects are recorded and the decision on the quality level of the whole bundle is determined as the number of defectives garments are identified from

the inspection (Glock and Kuz, 2005). Prior to this situation, it is very important for all QC inspectors understand their job very well and been exposed with multiple trainings in the aspect of quality control and technical typically in the sewing process (Kadolph, 2007). Besides, the inspector also must understand the quality requirement by different buyers or customers, since they are also responsible for a decision making in their daily routine job (Glock and Kunz,2005).

The same procedures of AQL-based sampling are continually followed during the final inspection. However, the person in-charge can be from the company itself or the independent agent who has been appointed by the buyer to perform the inspection on the behalf of them. Normally, the auditor or the buyer QC will conduct the inspection for shipment approval (Mehta, 2004; Glock and Kunz, 2005; Kadolph, 2007). At this level of inspection, the finished garment is inspected for overall quality of the garment which including the material used, seam and stitches, consistency of labels and measurements according to the size specification with the correct packaging (Brown and Rice, 2001; Glock and Kunz, 2005).

2.9 QC issues affecting the QM practices in RTW garment manufacturing

The internalisation of QM in RTW garment manufacturing can be hindered with the existence and unsolved QC issues which could affect the journey to successful QM. Previous literature has provided findings of the QC issues involving many countries with different demographic background and market segmentation. Figure 2.4 shows the issues addressed from the cited literature that mostly related to people and process. It was found that the cultural and language differences, piece-rate wage system, unskilled workers, lack of knowledge and leadership are the main root causes of identified problems. As the industry put reliance to the worker for the main operation of garment manufacturing, the quality issues related to human are critical compared to other technical issues for the garment industry. Qiu (2009) reported that ‘soft aspect’ concerning human factors as the key success factor in QM compared to ‘hard aspect’ which relates to series of procedures and range of tools and techniques. Thus, the quality issues affecting the QM practices in RTW garment manufacturing need to be explored further as the industry relied to the human resources for the manufacturing activities. The following sections discuss the QC issues in the respect of human and statistical sampling as summarised in Figure 2.4.

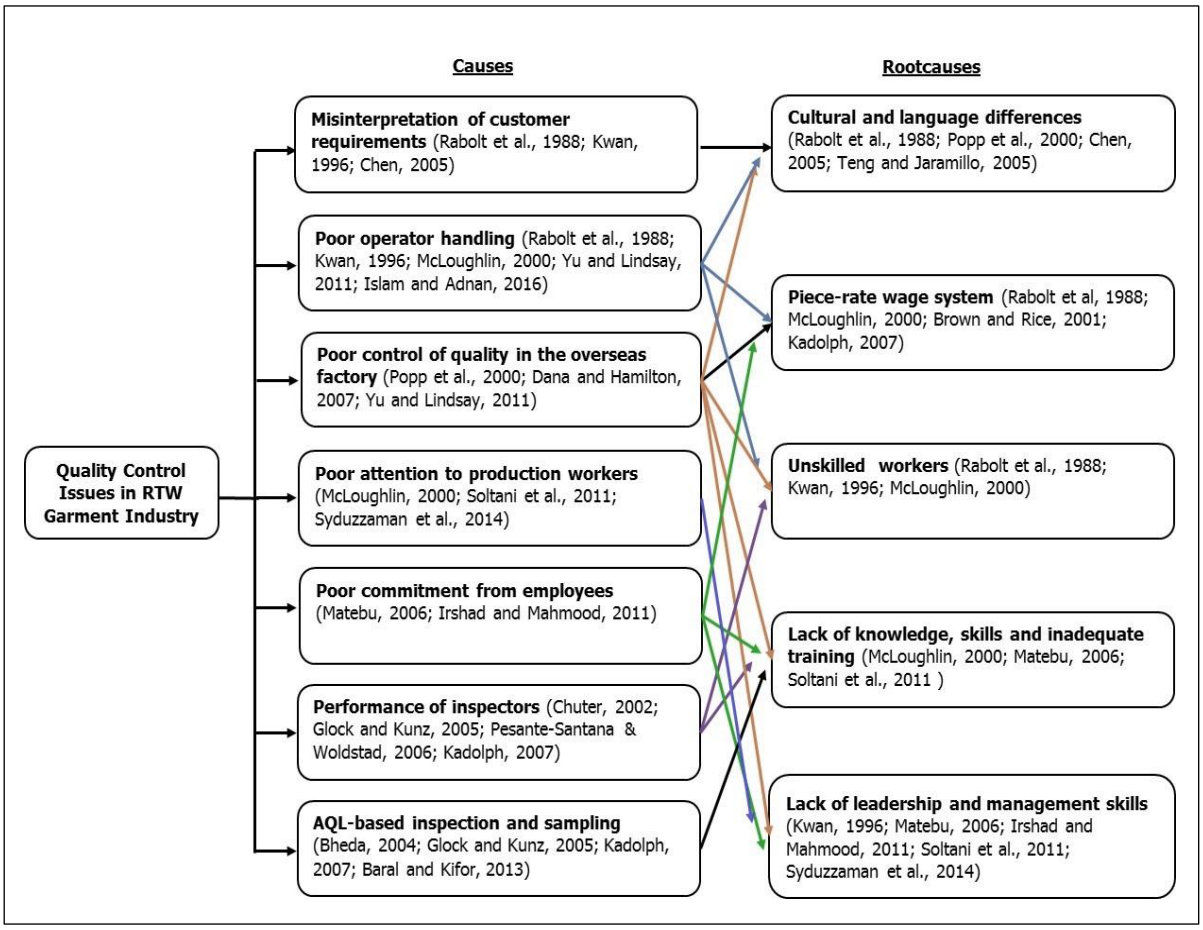
Understanding the main issues in the context of labour-intensive environment may results in establishing ways to remove the barriers in the path of adopting TQM and planning the strategies towards achieving an effective implementation of quality management in the garment industry.

2.9.1 Human issues

A considerable amount of literature has been published on the barrier to quality management implementation in different countries settings (Djerdjour and Patel, 2000; Rahman and Tannock, 2005; Kumar and Antony, 2008; Conti, 2010; Lazibat, 2010; Ab Wahid, 2012; Majumdar and Manohar, 2016). These studies have found poor employee's commitment as the ultimate reason for the quality management failure. Consequently, a poor commitment has led to many other problems such as lack of cooperation and participation between employees, lack of skills and knowledge, lack of awareness and understanding of the adopted quality standards, poor training/coaching and the worker's negative attitude. All mentioned reasons show that the involvement of people in developing a genuine quality culture are of paramount importance for a long-term journey to successful quality management.

It is often said that human resources are the biggest assets of any organisation. The textile and clothing industry, compared to others, is still the world's biggest employer of people (McLoughlin, 2000). Creating and sustaining quality management in the labour-intensive environment brings challenges to manufacturers without gaining a full commitment from employees at all levels of operation and management. Previous studies have found that poor commitments from employees are the obstacles experienced by textile companies to maintain their quality management (Matebu, 2006; Khalid et al., 2011). According to the authors, low awareness of quality and lack of participation of employees in quality improvement activities are the barriers to the adoption of quality management.

Figure 2.4 Quality control issues in garment industry



Khalid et al. (2011) reported that non-production functions such as marketing, purchasing, finance and maintenance were refused participation in the quality improvement activities because of their wrong perceptions towards the concept of quality management. Quality improvement has been perceived as the responsibilities of production and QC teams instead of the responsibility of everyone in the companies. Many organisations in developing countries struggle to implement quality management activities due to above-mentioned human issues (Djerdjour and Patel, 2000).

Operator handling is the most crucial factor in producing high-quality garments compared to fabric, thread and machine (McLoughlin, 2000). Although a source of manpower is not the main issue in the developing economies (Au, 1997), it is impossible to employ sewing operators with a complete package of sewing skills. According to Rabolt et al. (1988), skilled workers are not only significant for sewing operations but also in the pressing of finished garments. The performance and

capabilities of each operator vary, and poor control of operator handling may increase the tendency to get products that do not meet the specification. Kwan (1996) reports that unskilled workers tend to make mistakes and slow productivity. She also highlights the worker's working attitude. Most of them are lack responsibility and are less enthusiastic to perform the job, resulting in unreported fault for a further action. As a result, product deficiency rates and rates of penalty's claim increase and become an extra cost to the manufacturer. Moreover, as the workers in the garment factory are the lowest paid of all manufacturing industries (McLoughlin, 2000), a piece-rate wage system is still utilised in many garment companies (Rabolt et al, 1988; Brown and Rice, 2001). The main disadvantage of this system is the operators get motivated to speed up the sewing process to receive more monthly pay depending on the quantity of the sewn garment parts, without considering the aspect of quality in the first place (Kadolph, 2007). Although the system is still widely used, unfortunately, sewing operators have become money-driven instead to get the job done quickly (McLoughlin, 2000). This concept of wages is commonly used by manufacturers who utilised mass production method in the factory, resulting quality problems in the production (Rabolt et al, 1988). When sewing operators work too fast to increase rate of production, some mistakes might occur and can be a burden to the next process. This might be a reason for much attention given in quality control during in the assembly line, whereby a group of the in-line quality controller is assigned to monitor sewing operator's performance.

Several studies demonstrated that workers are often undervalued by authoritarian management (see McLoughlin, 2000; Soltani et al., 2011; Syduzzaman et al., 2014). According to the authors, poor management styles from the legacy of traditional quality management system among the senior management has developed a wrong perception on the precept of total quality throughout the organisation. The senior management has failed to educate their employees and disseminate the idea and the principles of total quality efficiently. They view the responsibility of quality lies with specific peoples and departments rather than the whole organisation, hence created the isolation of QM implementation for different level of management and operation (Khalid et al., 2011; 2011; Syduzzaman et al., 2014). Soltani et al. (2011) state the culture to pinpoint and blame the workers for any fault during the garment production is common and followed by strict disciplinary actions which lead to

dismissal from the job. The authors believe, this kind of working environment would prevent the workers to work seriously for quality. The authoritarian management style and bureaucratic structure of quality system have created unpleasant emotion among the workers for any wrong doing (Soltani et al., 2011). Therefore, it is difficult to gain co-operation from the production workers and building a teamwork to sustain the QM. QM is not viewed as a system to integrate peoples in managing processes towards better product's quality, but it is more likely as periodical company's activities initiated by quality-related personnel. Hence, it shows a big gap of understanding of company's quality management between the senior management and production workers. In this situation, the role of senior management is vital to ensure the information on quality management is communicated effectively to all level of employees. It is also important for senior management to overcome a deficiency in knowledge with scheduled training to empower their employees (McLoughlin, 2000; Pesante-Santana & Woldstad, 2006). Hence this would lead to greater involvement in the quality improvement. A study by Chowdhury et al. (2007) demonstrated that the senior management commitment to quality management practices has contributed to better product quality as compared to those companies with a low commitment to quality. Therefore, the involvement of all employees is a key to building a quality culture in an organisation.

In relation with the above findings, the production workers have often viewed QM as a kind of instruction from a senior management, rather than their responsibility. Without any action from the senior management, the workers are complacent to practise their own style of working habit which let them to do non value-added activities. A recent study by Islam and Adnan (2016) highlight the importance of tackling unnecessary talking among the sewing operators during the working hours. The authors believe this problem has led to decrease in productivity that may also affect the quality of the garments during production. According to them, it is evident that the psychological approach has been a successful attempt to change the mindset of operators. Sewing operators were dictated to wear face masks as a requirement from the international buyers for maintaining health. The reward system has been introduced and will benefit the top three performances. The idea to implement an action plan which is more psychological driven was purposely to encourage them to inherently focus on quality and be responsible for each piece of

garment they sewn instead of work rapidly for money. On the contrary, sewing operators might have their own reasons of this irrelevant communication. A repetitive work in the assembly lines and sit for long hours with a noise that came from the industrial sewing machine have created boredom in their routine task. Therefore, talking to each other might reduce a feeling of tiredness and drowsy among them.

As reported from numerous studies, quality control issues in the clothing supply chains could not be avoided notably when the production is done in a different location. The buyers are unable to control and execute their quality management practices and monitor the manufacturing process closely due to lack of geographical proximity (Popp et al., 2000; Dana and Hamilton, 2007; Yu and Lindsay, 2011). Poor control of quality in the overseas factory have rendered many other problems which associated with people who involved in the garment production. Communication problems are the main quality control issues when the production has been relocated to other countries, where English is not the first language. Ineffective communication between the senior management and production workers or with the overseas buyers were happened due to cultural and languages difference (Rabolt et al., 1988; Popp et al., 2000; Chen, 2005; Teng and Jaramillo, 2005). It was noted in Rabolt et al. (1988), that production workers in India were having difficulties to conceptualised western fashion due to cultural differences. As a result, the rejection rate increased because the garments were not following the designer's specification. Furthermore, the language problem occurred when they were not able to speak and read written English instruction, hence led to the wrong labelling of the sewn garments. The authors also shared an interesting finding of the usage of word 'yes' between importing and exporting countries, which can be misunderstood across cultures. For instance, the word 'yes' is utilised to show understanding of the communication, while in different cultures mean a sign of politeness and agreement. Chen (2005) reports the similar problem occurred in China. He states that low proficiency in English have made production workers misinterpreted the retailer specifications. Poor communication has developed misunderstanding and mistranslation of the customer requirements resulting low-quality garments. According to a case study conducted by Yu and Lindsay (2011) involving fashion retailers in New Zealand, quality problems are still encountered even though they have provided the China

factories with approved samples, documented requirements, as well people to monitor the manufacturing process.

However, Kwan (1996) had the opposite experiences as a merchandiser. Despite a similarity in cultural background between Hong Kong fashion entrepreneurs and China manufacturers, quality problems still appeared due to misinterpretation on certain situation and dissimilarities of management styles of senior management. Poor in leadership and lack of management skills among the Chinese Managers have created inappropriate decisions and portrayed bad examples to other employees. This, arguably implies that communication problems could appear in any organisation, not only involving countries with cultural and language differences. Ineffective communication could also inhibit the implementation of quality management and obstruct the quality improvement process in the garment manufacturing companies. Thus, developing an effective medium of communication throughout a global supply chain for garment manufacturing is essential to minimise barriers to daily communication among employees at all level of management and operation.

2.9.2 AQL-based inspection and sampling issues

Generally, the concept of sampling brought a meaning that only a certain number of samples is selected for inspection that represents the quality of the entire lot. According to Gryna et al. (2007), when the decision is made based on the quality of representative samples, it does not provide refine estimates of lot quality. The authors also mention that sampling involves a risk that the sample will not adequately reflect the condition of the lot. When the lot is being accepted because of the defective units found from the samples inspected are less than the maximum percentage defective specified in the AQL table, there is also a possibility that the units that have not been selected for inspection are presented with defects. This scenario can be further understood with the term producer's risk and customer's risk (Bheda, 2004; Kadolph, 2007). These two types of risk are associated with the use of AQL-based sampling for acceptance decisions that implies the possibility of a wrong decision made by the manufacturer and retailer.

According to Kadolph (2007), the producer's risk, known as a type I error, with a symbol α is defined as the possibility of rejecting the good lot by the manufacturer.

Meanwhile, the consumer's risk, known as a type II error with a symbol β is defined as the possibility of accepting inferior lots by the end user of the garments. Kadolph (2007) also explained that type I (α risk) error occurs when only a poor quality of the garments of the production lot has been randomly selected for the inspection. Consequently, the production lot is rejected, but when the problem is being investigated, the rejection lot was still within the company's defined limits for product variation. Conversely, the type II (β risk) indicates that only good samples are taken out for inspection, thus the production lot is accepted and delivered to the customer. Unfortunately, the consumer will find out the unacceptable quality of the garment after purchase and this incident might tarnish the retailer's reputation. According to the risks explained above, the manufacturer is more concerned with α risk, while the retailer is concerned about β risk. Both risks are considered the major disadvantages of using the acceptance sampling for garment inspection (Glock and Kunz, 2005).

Bheda (2004), who is a leading consultant and researcher in clothing manufacturing management highlights an issue associated with the use of AQL among quality practitioners in the apparel industry. Based on his experiences as a consultant in the Indian apparel industry, he found that the concept of AQL is not fully understood by the executives in the apparel industry. The person-in-charge in the quality control department could simply read the AQL table to conduct the inspection, but as according to Bheda (2004), some of them did not understand the main reason for conducting an AQL-based sampling and the reason of using it. Baral and Kifor (2013) also report lack of knowledge and technical support are the limitation of practising AQL-based inspection in most garment companies in Bangladesh. According to Bheda (2004) and Baral and Kifor (2013), it can be understood that manufacturers can easily implemented AQL-based sampling to make decision on product' quality before shipment. The technique of inspection and sampling is not complicated, and the inspector is able to conduct the inspection with the AQL table as a reference. However, the AQL-based sampling could not be implemented effectively because most manufacturers lack of technical knowledge on AQL and they did not utilise AQL to determine the level of quality currently achieved. The technical knowledge in AQL would help manufacturers to produce a good quality product prior shipment to the customers (Matebu, 2006). Rabolt et al. (1988) suggested that manufacturers and sub-contractors should educate their workers to

acceptable levels of quality to minimise the problems associated with production processes. Kadolph (2007) states the knowledge and understanding of the sampling concept and the rationale of using it for garment inspection are important as it provides information that can be used by companies to improve production and inspection process. She also suggests that the management should take an initiative to provide the required knowledge about a desired quality level for the garment produced in the company amongst inspectors, so that they understand the reason for compliance with specific standards established by the company's or buyer.

It is a well-known fact that most quality inspection is conducted by human inspectors. Although, quality inspectors should be able to work with patience and completely understand his/her responsibilities (Matebu, 2006), the inspection and quality check carried out by humans is prone to error, even in modern manufacturing (Pesante-Santana & Woldstad, 2006). Chuter (2002) draws attention to the human aspects of the quality inspection task. He states that inspectors can only sustain their concentration for half an hour due to a monotonous job and continuous examination of inspection. Similarly, Pesante-Santana & Woldstad (2006) reports that human inspectors usually find only ~80% of the defects. According to the authors, the quality inspection is perceived as intrinsically boring, hence a mild stress can increase their focus to detect any non-conformity and improve the response time. Glock and Kunz (2005) mention the individual performance of an inspector varies, hence the dependence on human judgement may produce an inaccurate inspection. The authors also added that the inconsistency of inspector's work due to lack of concentration or distracted for some reason may cause inaccurate information to be recorded in the regular inspection check sheet. Consequently, the misinterpretation of the recorded information may occur and would lead to type 1 error at the level of manufacturer. Therefore, the reward system recommended by Kadolph (2007) in promoting a better morale amongst inspectors is a great idea to be implemented in the garment industry. This system will encourage inspector to work consistently to meet specification since the pay is based on the quality of work. A suggestion proposed by Pesante-Santana & Woldstad (2006) is also useful, whereby the management should identify the inspector with the best performance and utilise his or her inspection strategy for quality improvement.

2.10 Summary

In this chapter, the concept of quality and the level of implementation of quality management practices in the garment manufacturing industry was examined. Although the garment industry has been competitive in terms of the willingness to adopt quality management practices, it was found that the industry still relied heavily with ‘control systems’ to survive in the global market, which is against the precept of quality management. The barriers in maintaining QA systems were discussed based on the findings that were mostly cited from research in the developing economies. It indicates there is a gap exists in QM for the labour-intensive industry which requires an in-depth research. Next chapter explains the conceptual design of chosen research methodology to conduct this research which incorporates the elements of quantitative and qualitative data collection and analysis.

CHAPTER 3

RESEARCH METHODOLOGY

3.0 Introduction

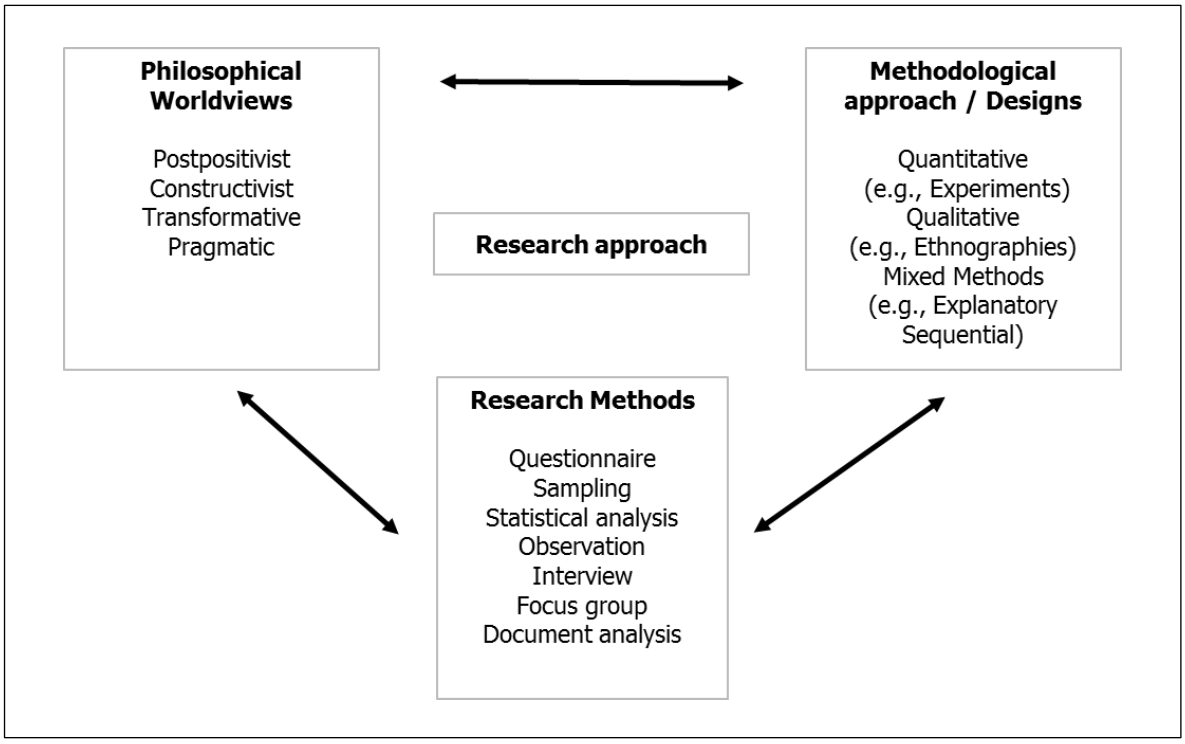
This chapter will present the methodology chosen to address the aims of this research based on the conceptual design developed for this research. The chapter begins with the discussion of the philosophical worldview adopted in Section 3.1. Section 3.2 explains the rationale of using the Explanatory Sequential Mixed Method (ESMM) approaches to collate data in two different phases of the research inquiry. Section 3.3 and 3.4 describe the process of developing a valid and reliable questionnaire survey and the methods to analyse the quantitative data. Section 3.5 elaborates on case study methods, which utilise multiple sources of evidence such as interviews, observations and documents review to follow-up the key findings from the questionnaire survey. This section also explains the data analysis for this case study and some issues involving the concept of validity and reliability in qualitative research. The overall contribution of this chapter is summarised in section 3.6.

3.1 Philosophical worldview

The process of gaining knowledge in research commences with a philosophical foundation which helps to guide the process of research and the conduct of inquiry (Creswell and Plano Clark, 2011). The importance of identifying the most suitable research approach, specifically in methodology and methods to conduct research should be rationally based on a researcher's philosophical worldview. Creswell (2014) has used the term *worldview* instead of epistemologies and ontologies (Crotty, 1998) and paradigms (Lincoln, Lynham, and Guba, 2011) to define a basic set of beliefs or assumptions that guide inquiries (Guba, 1990). Despite different terms given by the authors to represent the existence of the philosophical worldviews, it aims to inform how researchers acquire knowledge based on what they know (Creswell and Plano Clark, 2011; Brinkmann and Kvale, 2015) and what types of evidence they use to make claims (Creswell, 2015; Yin, 2016).

According to Creswell (2015), each individual researcher holds certain beliefs, or known as a belief system (Yin, 2016), in their field or discipline of research that is developed when they socialised within a community of researchers. The types of beliefs held by researchers are influenced by their selected worldview, research problems, personal experiences and the audience (Creswell, 2014). These factors are deemed important before selecting the most suitable designs for data gathering methods. Easterby-Smith et al. (2002, as cited in Gray, 2014) stated the worldview or epistemological stance can help to clarify issues of research design and help the researcher to determine the designs that will fit into the research framework. The interaction of worldviews, methodological approach and research methods are depicted in Figure 3.1. It shows how the philosophical worldviews affect a choice of research approach based on the designs that is relate to the worldview and the specific methods to collate data and analysis. However, the choice of a worldview also depends on the level of a researcher's understanding of different worldviews and which one seems to resonate with particular methods (Creswell, 2015).

Figure 3.1 The interconnection of worldviews, methodological approach and methods (Creswell, 2014)



3.1.1 The Postpositivist Worldview

Postpositivism has emerged as a philosophical stance that extending from positivism. It is a revised form of positivism that addresses criticisms of quantitative orientation (Teddlie and Tashakkori, 2009). Although positivism has been among the most influential stance between 1930s to the 1960s, the results of scientific inquiry from this worldview have been substantially challenged (Gray, 2014). Crotty (1998, as cited in Gray, 2014) stated that the analysis made from a positivistic stance would be presented as objective facts and established truth, without acknowledging the investigator's influence on their research findings (Teddlie and Tashakkori, 2009). Therefore, considering viewpoints of other scholars, Gray (2014) concluded that the empirical inquiry based upon scientific observation has a tendency to be fallible, hence it extends philosophical knowledge from positivism to postpositivism which acknowledges that truth could not be completely explained. A careful numeric measure of observations is required to make claims of knowledge particularly when studying the behaviour and actions of individuals (Creswell, 2014).

Through a postpositivist lens, Creswell (2014) noted that the causes that influence outcomes of the research problems studied are necessary to be identified and assessed. He added that a postpositivist utilises theory to begin research, collects data and analyses the findings, makes necessary revisions and finally proceeds to additional methods to gain in-depth understanding of the phenomena. In addition, according to Teddlie and Tashakkori (2009), although postpositivism is primarily related to quantitative (QUAN) strand, a postpositivist may also incorporate qualitative (QUAL) methods at some point during the research process. It allows flexible research methods to support wide sources of knowledge that is discovered during the engagement between a researcher and the subject studied (Bryman, 1984). Therefore, as a postpositivist, a researcher views nature of reality based on a critical realism as a common form of postpositivism. Adopting a critical realism perspective implies both QUAN and QUAL methods can be used together and potentially contributes to mixed methods research (Creswell and Plano Clark, 2011).

3.1.2 Critical Realism

A philosophical system of Critical Realism (CR) was pioneered in the UK by the Indo-British philosopher, Roy Bhaskar in collaboration with a group of British social theorists (Gorski, 2013). CR has been discussed as an integration of a realist ontology which means there is a real world that exists independently of our perceptions, theories, and constructions with a constructivist epistemology, which defined as the understanding of this world is inevitably a construction from our own perspectives and standpoint (Creswell and Plano Clark, 2011:45). This philosophy validates and supports the key aspects of both QUAN and QUAL approaches (McEvoy and Richards, 2006; Creswell and Plano Clark, 2011). Reliance to one type of evidence might not suffice, thus the CR philosophy perspective enables the researcher to investigate the research problem by utilising both the QUAN and QUAL elements to understand the reality instead of only depending on specific observation and measurement to postulate theories as a desired outcome (Trochim, 2006). Adding to this, Trochim (2006) also pointed out that as a critical realist, despite of multiple measures and observations, everyone is inherently biased by their cultures and experiences, worldviews and their level of understanding and beliefs. For instance, participants who involved in a research might provide dissimilar findings on the subjects being researched based on their experiences and knowledge. In critical realism, each individual can construct their own view of the world based on their own theoretical resources and investigative interests in order to develop in-depth explanation and understanding (McEvoy and Richards, 2006). Therefore, methodological triangulation need to be carried out to understand the phenomena or any issue investigated. In this study, critical realism (CR) philosophy perspective was adopted to shape the mixed method approach to research. The selection of mixed method research design was further explained in Section 3.3.1.

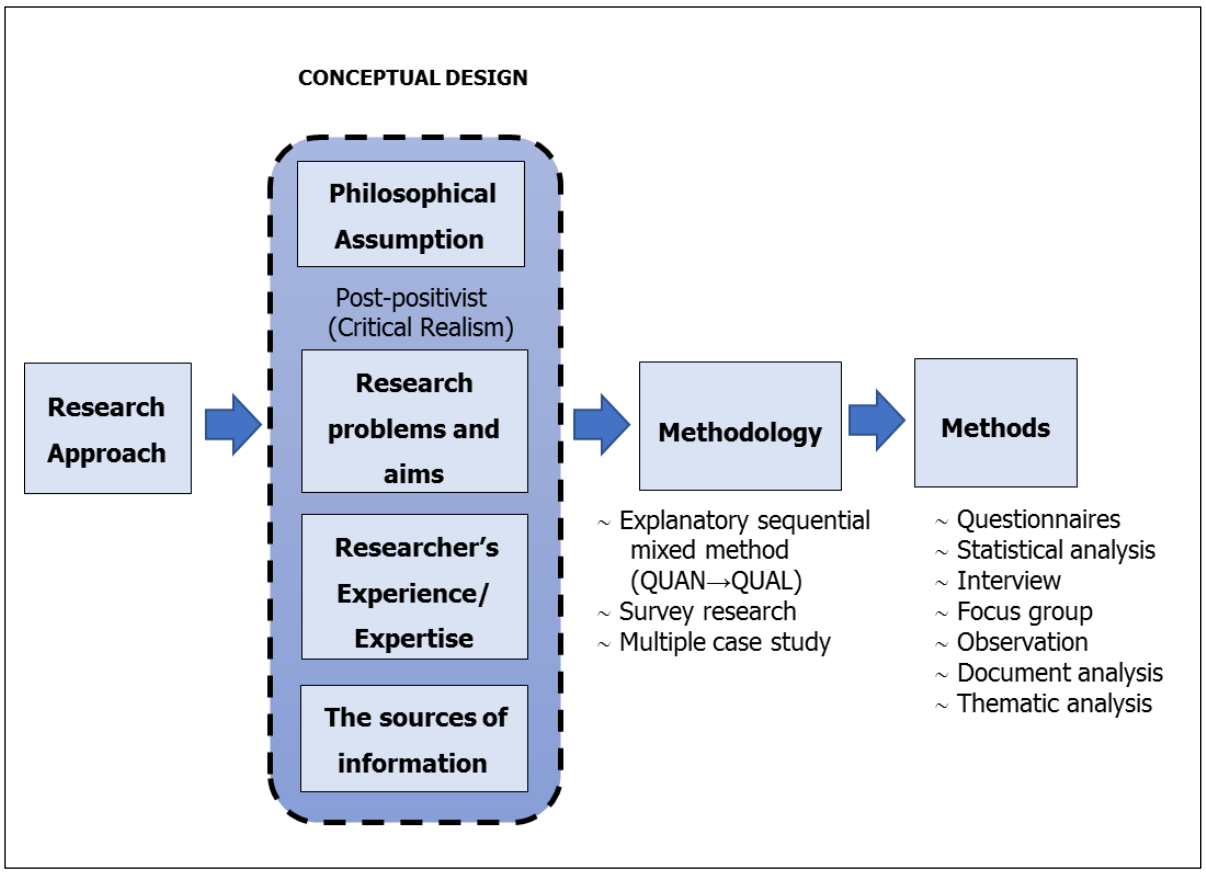
3.2 Research Design

A research design is a procedural plan to conduct a research, involving steps of data collection, measurement and analysis of data that aims to answer the research questions validly and accurately (Gray, 2014). A well-planned research design would help to communicate to others the most suitable methods chosen, the procedures for data collection, analysis and the interpretation to complete a study (Kumar, 2011; Creswell, 2014). In this study, considering critical realism ontology to solve the research problems and provide answers to the aims and research questions, the explanatory sequential mixed methods were chosen for the overall structure of this research which integrates both QUAN and QUAL studies. Mixed methods have been defined as a research approach in which the investigator gathers both QUAN (close-ended) and QUAL (open-ended) data, integrates the two, and then draws interpretations based on the combined strength of both sets of data to understand research problems (Creswell, 2015:2). Bryman (1992 as cited in Gray, 2014) pointed out it is common that a QUAN survey is used to identify distinct groups of respondents because of contrasting views on a subject. Thus, the differences exist among these groups can be further explored during the follow-up QUAL interview to deepen understanding of the phenomenon (Gray, 2014).

3.2.1 The Selection of Mixed Method Research

It is essential to present a rationale and justification of a selected research design (Kumar, 2011). There must be factors affecting a selection of one design over another, hence, the key decisions to adopt mixed methods design should be explained clearly (Creswell and Plano Clark, 2011; Creswell, 2014). According to Creswell (2014;20), the selection of research design should be based on the philosophical assumptions researcher bring to the study, the nature of the research problem or issue being addressed and the researcher's personal experience. In this study, the key decisions of choosing mixed methods design were summarised as a conceptual design in Figure 3.2.

Figure 3.2 Relationship of the conceptual design and research methodology (adapted from Creswell, 2014 and Gray, 2014)



Besides the philosophical assumptions elaborated in Section 3.1, other key decisions are explained as follows:

a) Research Problems and Aims

The problems or issues underlying the need for the study can be researched systematically by using either QUAN or QUAL methodologies to gather information. However, according to Creswell (2014), not all research problems can be solved using the same approaches. Developing the concrete aims would guide the researcher to conduct the study within its context to overcome identified problems. As mentioned in Section 1.4 of Chapter 1, this study brought up some issues of quality management practices in the garment manufacturing sector that has been known as truly labour-intensive industry by considering Malaysian RTW garments as a scope of study. Based on the aims in Section 1.5 of Chapter 1 that need to be addressed, the best approach to begin the study was a QUAN approach.

To achieve the first aim, a general understanding on QM practices among the garment manufacturers must be collated, hence a questionnaire was the most suitable research instrument to use for data collection during the first phase of study. The key findings determined from QUAN approach can be used for follow-up qualitative interview, observation and document analysis (Gray, 2014). The reasons for using QUAL approach in the second phase was to obtain a more comprehensive view on the QUAN results and analysis. There must be the real-world problems in the context of personal experiences which is unknown instead of deficiencies in the literature (Creswell, 2015). Therefore, a mixed method is the best approach to address the research problem as well to achieve the purpose of the study. The rationale of this approach is that the QUAN data and their subsequent analysis provide a general understanding of the research problem (Teddlie and Tashakkori, 2009). The QUAL data and their analysis, refine and explain those QUAN results by exploring the issues raised in more depth (Creswell and Plano Clark, 2011). Relying only to one data source alone is insufficient, results need to be explained and examined and a study need to be enhanced through adding a second method. The explanatory sequential mixed method (ESMM) chosen for this study was explained further in Section 3.3.2.

b) Researcher's personal experiences and expertise

Creswell (2014) and Gary (2014) stated that selecting an issue that is within the researcher capabilities is essential and can influence the choice of the research approach. Adding to this, Kumar (2011) mentioned the researcher adopts specific research design due to the academic discipline in which she or he has been trained and involved in. The topic and scope of this study was chosen based on researcher's industrial work experiences in the Malaysian textile and garment industry, mainly in the area of quality control (QC) and quality assurance (QA). Experiences as a quality system auditor in both manufacturing and education industry have provided a better understanding on the requirement of international standards and of fundamental knowledge in the quality management system such as ISO 9000 Quality Assurance System. Furthermore, the similar research approach was adopted for Master's Degree dissertation in 2009. Besides, the exposure of multiple training in technical and scientific writing, statistics, research methodologies and data analysis, surely gave a positive impact in the research approach selected.

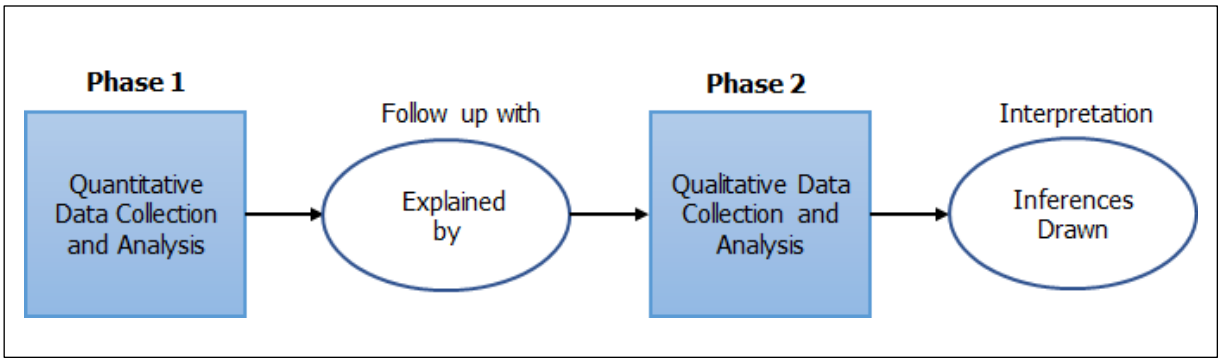
c) The sources of information

The scope and sampling of this study involved the Malaysian garment manufacturers who have supplied to the domestic and the international market. Based on the research aims, the sources of information were derived from the peoples working in the RTW garment production. In the second phase of research work, there is a need to engage with certain group of employees in the industry to have a deeper understanding on the issues highlighted earlier from QUAN results and analysis. The methods such as personal interview, multiple observations and document analysis can be conducted to gather the required information. Due to this reason, a mixed method was a suitable approach to achieve the research aims and the research questions for both phases of the study. Therefore, methodological triangulation is also possible with the use of both QUAN and QUAL approach in a single study (Gray, 2014).

3.2.2 Explanatory Sequential Mixed Method

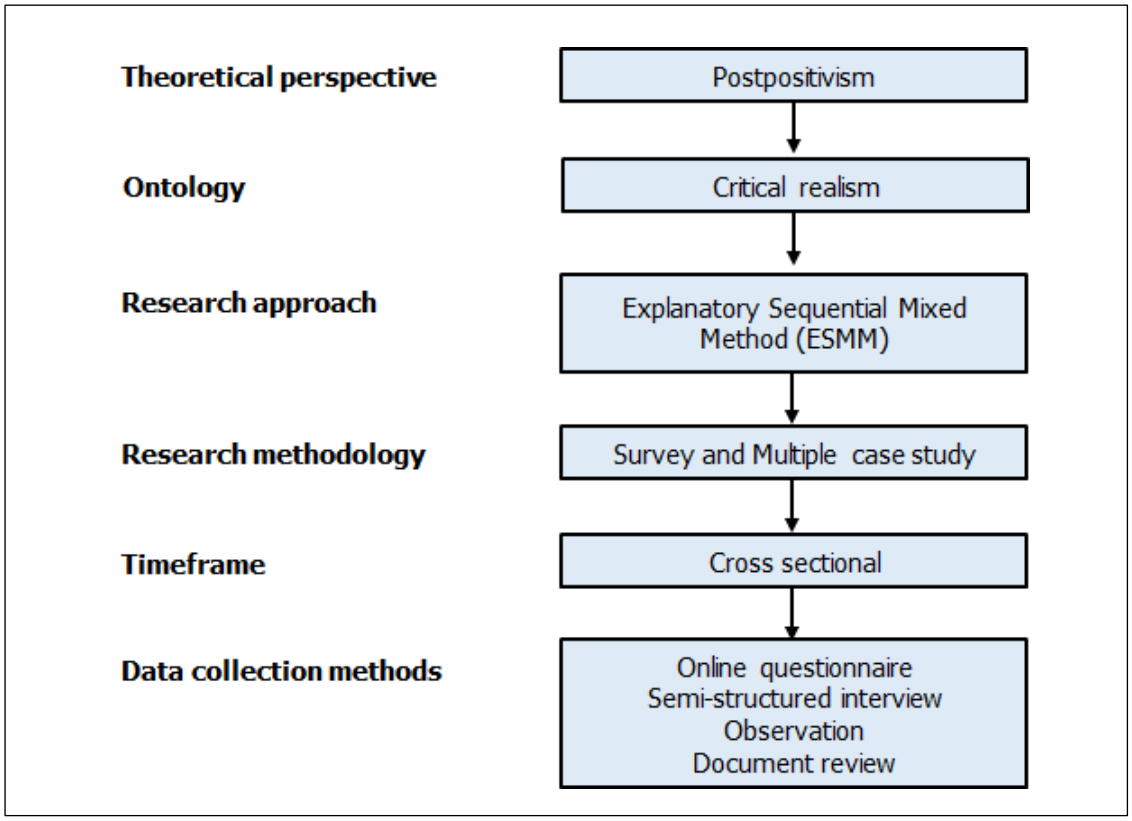
According to Creswell (2014), these two phases of mixed method design begin with the collection and analysis of quantitative data and then followed by the qualitative phase of work (See Figure 3.3). The intent of this research design is to use a qualitative strand to explain the quantitative significant or nonsignificant results and to identify if there are some surprising results (Creswell and Plano Clark, 2011). Therefore, it is important to determine which QUAN results need further explanation and investigation upon entering the QUAL phase of data collection and analysis.

Figure 3.3 The procedures in the two-phase explanatory sequential design (Creswell, 2015)



The study comprised of two phases of research. In the first phase, the survey design was used to obtain the required information to answer the quantitative research questions. As shown in Figure 3.3, the qualitative methods are adopted in the second phase because the results need further explanation and justification from the selected participants on how the findings occurred (Creswell, 2015). The rationale for this approach is the data that obtained from both quantitative (QUAN) and qualitative (QUAL) strand will provide a more accurate outcome, served as the catalyst for a more balanced evaluation (Teddlie and Tashakkori, 2009) and being responsive to new insight of a methodological movement (Gray, 2014). Thus, this approach may help towards analysing a more reliable and valid generalisation (Yusof, 1997). In short, the selection of a mixed methods approach can provide a more complete understanding of a research problem than a single approach alone (Creswell, 2014). The overall elements of the research process in this study is depicted in Figure 3.4.

Figure 3.4 Elements of the research process (adapted from Gray, 2014)



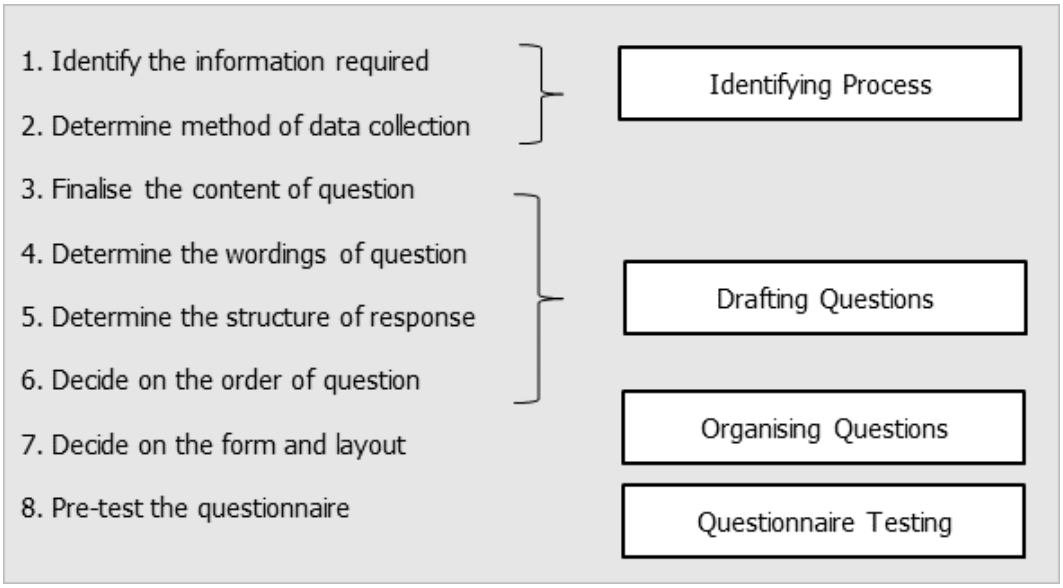
3.3 Survey Methods

Survey, according to Sue and Ritter (2012), is a system for gathering information and comprised of different methods which are not only limited to the use of questionnaires. Data collection via survey methods can be achieved by conducting interviews and both online and self-administered mail questionnaires. Creswell (2014:155) stated that the survey provides a numeric description, attitudes or opinions of a targeted population by studying samples of that population. This study utilised an online questionnaire to collect data from respondents. Development of the questionnaires is discussed in the following section.

3.3.1 Questionnaire Design

Questionnaires have been used as data gathering tools in many research areas which respondent are asked to respond to the same set of questions in a pre-determined order (Gray, 2014; p.352). It consists of structured and focused questions that have been deliberately designed and tested to collate information from targeted respondents (Salkind, 2014). Prior to answering the listed questions, respondents should read the questions carefully and make their own interpretation to select or write down the most suitable answer to each of the questions (Kumar, 2011). Once a data collection period from this method is complete, the result analysis from the questionnaires can be used to achieve the objective of the research. In addition, a further exploration of research problems could be followed up by in-depth semi-structured interviews or observations based on the key findings obtained from the questionnaires. Therefore, designing a valid, reliable and objective questionnaire is essential before it is accessible to the study population (Gray, 2014). The process of developing a valid and reliable survey questions was according to the sequential steps shown in Figure 3.5.

Figure 3.5 Steps in the questionnaire development (Awang, 2012)



Considering the survey can be administered using postal questionnaires, email, web-based, including collective and public place administration (Kumar, 2011), the online questionnaire was chosen as a research tool for the first phase of study. The online questionnaire is rapidly gaining popularity in both academic and non-academic world for a low-cost method and speedy response from geographically dispersed participants (Sue and Ritter, 2011). In this study, the selection of online questionnaires as compared to other techniques is purposely to maximise the return rate and given that many organisations have good connections to the Internet (Gray, 2014). The online questionnaire was developed using the Google form. It is a free web-based application, whereby the online form can be created, edited and stored online. The features provided by Google enable a researcher to systematically design and construct the questions according to the option given in the web in term of types of question, deciding on the response categories, sequencing questions according to the themes and the suitable layout. In short, a researcher can design and set up the questionnaire based on their own creativity by taking into consideration all steps needed to for the questionnaire development as shown in Figure 3.5.

Generally, the purpose of the survey is to answer the first aim and the research questions that have been developed earlier in this study. The main idea and

constructs for the questionnaire were based on the extensive literature review and the researcher's experiences in the research area. Thus, four themes in the quality management were identified and the process of constructing each question was based on the identified theme. The survey was organized into five sections and consist of 44 closed-ended and 2 open-ended questions. All the survey questions used a combination of nominal, ordinal and interval scale of measurement to comply with the data analysis requirement (See Table 3.1).

Table 3.1 Survey questions, measurement scales and data analysis

Research aims	Research Instrument : Online Questionnaire				Statistical analysis
	Section	Title/ Themes	No. of questions	Level of measurement	
To ascertain the quality management practices in the Malaysian garment manufacturing for the purpose of quality monitoring of mass-produced garments for the domestic and export market.	A	Organisational profile	1 - 10	Nominal Ordinal Interval	Descriptive Crosstabulation
	B	Quality management systems and practices in Malaysian garment industry	11 - 17	Nominal Ordinal	
	C	Quality control and inspection process in the garment industry	18 - 30	Nominal Ordinal	
	D	Acceptable Quality Level (AQL) for garment inspection	31 - 44	Nominal Ordinal	
	E	Individual profile	45 - 46	Nominal	

The details of each section as summarised in Table 3.1 are described as follows:

i) Section A - Organisational profile

This section comprised of ten questions intended to discover the background of garment companies and its main business activities. The questions asked on years of establishment, total number of employees, the location of factories, company's main product, market destination, category of companies, sewing production systems adopted, the involvement of sub-contractors and its processes.

ii) Section B – Quality management systems and practices in Malaysian garment industry

This section consisted of seven questions which aimed to determine the quality management systems adopted by the manufacturers. The questions included the years of implementation (if applicable), reasons for certification, the name of

department in-charge of quality, types of quality improvement programmes that have been carried out and their perception of the implementation of the quality systems in their organisation.

iii) Section C – Quality control and inspection process

The purpose of Section C is to understand the types of process control that have been utilised in the garment production processes. There were thirteen questions listed in this section asked about the inspection process adopted in the garment industry. This included nine different statements with a five-point Likert scales ranging from 1 = strongly disagree to 5 = strongly agree to evaluate respondent's opinion on the methods of inspection.

iv) Section D – Acceptable Quality Level (AQL) for garment inspection

This section focused to determine the adoption of AQL or other sampling techniques utilised for garment inspection among the manufacturers. There were fourteen questions asked in general the information of AQL or other method of sampling inspection in their company. Seven different statements were provided with a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree to evaluate respondent's opinion on the implementation of AQL-based inspection.

v) Section E – Individual profile

The last section of the questionnaire intended to get the information of an individual who supplied the information to complete Section A, B and D. There were only two questions asked the current job position and years of service in the garment companies.

The ordering of questions in each section was modified few times with the approval from the supervisors. Then, several aspects of the questionnaire were revised accordingly after pretesting or pre-pilot study (see Section 3.3.3). As a one-shot attempt at data gathering, the online survey should contain questions that are simple and easy to understand with no sign of ambiguity (Gray, 2014). The full launch of the survey was started in August 2014, but the survey was sent to the remaining samples in stages. The invitation e-mail was first sent to the potential respondents

and contained a link to access the online survey together with the electronic consent. This informed consent was provided as part of the introduction to the online survey, hence a signed consent form for respondents was not required. A returned complete survey means the respondents agreed to volunteer in this research and as well given their consent. A letter of confirmation as a postgraduate research student in the Manchester Metropolitan University (See **Appendix 1**) and the formal letter requesting the information using the online survey were attached together with this email (See **Appendix 2**). Next, the follow–up email as a soft reminder was sent on the following week if no response received from the respondent. The telephone interview was also conducted if the person in charge needed assistance to fill in the online survey. This method was used to increase the response rate.

There were a few respondents who requested a soft copy of the questionnaire through an e-mail, thus a paper-based questionnaire (See **Appendix 3**) was created as an optional research instrument. This was based on the feedback from a few respondents who preferred to print out the questionnaire as they needed extra time to discuss the correct answer for some of the questions. Usually, a soft copy of the survey was requested by the Human Resources (HR) Manager of the garment companies. This is because some companies employed experienced foreign workers to lead the quality department, whereby the language proficiency is one of the biggest challenges to confront with when the foreign workers were recruited. Therefore, a brief discussion between the HR manager and QAQC personnel was needed typically to answer the technical part of the questions. The feedback of each respondent can be viewed in the Google spreadsheet, whereby all responses were stored in the Google drive with a password protected format and listed based on the date they submitted the form.

3.3.2 Population and Sampling Procedures

The population and sampling are essential aspects in the survey research. According to Salkind (2014: 185), a population is a group of potential participants to whom the researcher wants to generalise the results of a study. When the study population is identified as to fulfil the scope of the research, the sampling procedure should be planned accordingly for data collection purposes (Creswell, 2014). The population in this study was targeted to the middle or senior management personnel

that possess quality management background in the Malaysian garment industry. The directory of garment companies was obtained from the Malaysian Knitting Manufacturers Association (MKMA), Malaysian Textile Manufacturers Association (MTMA) and from the webpage of the government agencies. However, although the profile of the garment companies can be accessed via the printed directories from MKMA and MTMA as well in the selected government agencies website, a complete company list that are located across five regions in Malaysia including in Central, Southern, Northern, East Coast and East Malaysia with a current contact information was difficult to collate. There were companies that registered as a member of MKMA and MTMA but the contact information such as company's telephone number and e-mail address were not updated. Meanwhile, there were also companies listed in the government agencies website, but these companies were not a member of either MTMA or MKMA. However, based on the available resources, the sampling frame or population members of this study was identified.

Probability sampling was chosen as the sampling technique for this survey research, whereby the selection of companies from a defined sampling frame depends on the random selection (Sue & Ritter, 2012). According to Salkind (2014), a decision to utilise a simple random sampling is deemed appropriate when the population members have similar important characteristics to be focused on. Thus, the selection of samples for this study were made based on a simple random sampling by using the sampling with replacement (Kumar, 2011). When this sampling technique is chosen, the online survey was sent to the group of companies as according to the sampling frame by stages. The representative of companies whom refused to participate is replaced with another company which has been not selected in the sampling population by sending them an email of invitation.

A total of 100 garment companies listed in the sampling frame were invited to participate in this study by completing the online survey. By December 2014, a total of 31 companies had successfully submitted their response – those respondents who replied using a paper-based questionnaire were also included. It represents a response rate of 31%. There were companies that refused to participate, delayed and quit responding. Considering the sampling frame and the cross-sectional timeframe for data collection in the first phase of this study, the response rate

received was deemed satisfactory. According to Roscoe (1975 as cited in Gray, 2014), it was recommended the samples of not less than 30 is acceptable for statistical analysis. Meanwhile, Salkind (2014) also stated that 30 is the minimum sample size required for the data analysis. As explained earlier in Section 3.3 for the research design, a series of follow-up interviews for multiple case studies was planned and scheduled in the second phase of research for in-depth exploration of the key findings obtained from the online survey. Therefore, the analysis and interpretation of data from multiple case studies would support and extend the understanding of the results obtained from the survey.

3.3.3 Pre-testing and Pilot Testing the Questionnaires

It is important to ensure the instruction, questions and categories of answers are understood by the respondents prior answering the questionnaire. The reason for pre-testing the questionnaire was to identify any problem in understanding and interpreting the questions, hence appropriate actions may be taken to re-examine the questions to make it clearer to respondents (Kumar, 2011). According to Sue and Ritter (2012), pretesting can be done by selecting small samples from the target population and inviting them to provide feedback on the questions and the technical elements of the questionnaires. In this study, the process of pretesting was successfully conducted in the middle of June 2014. The individuals involved in the pretesting process were quality practitioners that had been working in the Malaysian garment industry. Their feedback was very helpful before the online survey was deployed. A few questions were removed, and another set of survey questions was translated from English to *Malay* language to give choices to respondents based on their language preference. Each comment given by the expert were recorded. It was commented that the language, wordings, list of questions and technical terms used were easy to understand. The instruction also was clear. A summary contained the list of an expert who involved in the pre-testing and their feedback can be referred in **Appendix 4**.

Once the elements in the questionnaires were revised, the pilot study took place in the middle of July 2014. The online survey was sent to a small number of garment companies - about 10% of the sampling frame. This was purposely to check for patterns of e-mail invitations that have bounced back and any items in the online

survey that did not function properly (Sue and Ritter, 2011). Although the uses of online survey may offer flexibilities, opportunities to get unanticipated problems could happen (Gray, 2014). Based on 1% -2% feedback from respondent, minor changes related to the setting in the Google online form was modified.

3.3.4 Data Analysis for Quantitative Survey

The data extracted from the online survey was analysed using the SPSS version 21.0 for descriptive statistical procedures. Table 3.2 summarises the data analysis planned for the first phase of the study as according to a level of measurement for each question. At this phase, only the descriptive approaches of analysis were used to explain the data collated from the respondents. The crosstabulation of multiple variables was analysed to ascertain the pattern of data which can be grouped for further analysis for follow-up case study research. In addition, cross-tabulations helps to highlight the possible association between variables (Kumar, 2011). The findings from these analyses were deemed sufficient to answer the quantitative research aim and questions for the first phase of study. The complete results and analysis, as well the key findings selected for subsequent data collection can be referred to Chapter 4 of the thesis.

3.4 Validity and Reliability of Quantitative Data

It is essential for a researcher to ensure the validity and reliability of a measurement instrument, and it applies to any questionnaire used to collate data from participants. Salkind (2014: p.165) stated that the respected levels of reliability and validity are the hallmarks of good measurement practices. As part of maintaining the quality of the quantitative data, the methods to determine the validity and reliability for the questionnaire are explained as follows.

3.4.1 Validity

One of the critical aspect in developing a survey is to establish valid questions. The concept of validity refers to the ability of a selected research instrument to measure the items that it is designed to measure (Kumar, 2011). The importance to evaluate a validity of the questionnaire are purposely to establish the trustworthiness of results (Salkind, 2014) as well as the appropriateness, quality and accuracy of the adopted procedures (Kumar, 2011). Kumar (2011) also added that the process to establish

validity can be difficult because some of the questions involving a less tangible concept, hence it made a distinct difference in validity between quantitative and qualitative data.

There are three types of validity that are normally used in the quantitative research: content, criterion and construct validity. In this study, the validation of a questionnaire was based on the content validity. According to Kumar (2011) and Salkind (2014), content validity was established by the involvement of an expert in examining the questionnaire whether the statements or questions constructed represent the issues they are supposed to measure. In this study, content validity was judged by several quality experts in the Malaysian RTW garment industry. The process of validation was explained in Section 3.3.3 whereas the expert's opinion and feedback were taken into consideration to finalise the questionnaire and to ensure it would fit their purpose.

3.4.2 Reliability

It is important to test the reliability of a scale used in the survey. Reliability is referring to its ability to produce consistent and stable a measurement instrument (Salkind, 2014; p.169). This can be achieved when the same set of research instrument is used repeatedly to collect data, and produces same results under the same conditions (Kumar, 2011). In other words, if the instrument is measured today, a researcher would obtain the similar results by using the same instrument at some other time (Gray, 2014). However, the instrument should be given to the same population and condition as mentioned by Kumar (2011).

There are several ways of determining the reliability of an instrument for quantitative data. The common procedures can be classified either external or internal consistency (Kumar, 2011). To ensure the reliability of the questionnaire in this study, an internal consistency reliability analysis was carried out. Salkind (2014: p.170) refers it as a measure of how consistently each item measures the same underlying construct. Internal consistency analysis was reported as the most widely used reliability test in most of previous research (Abdullah, 2007). In both section C and D of the questionnaire, a multiple Likert scale questions were constructed with nine (9) items and seven (7) items respectively. The scale used for both sections were tested for internal consistency using the Cronbach's alpha coefficient. Pallant

(2010) stated that the Cronbach's alpha value above .7 is considered acceptable, but values above .8 are preferable. Initially the scale had an acceptable internal consistency, as determined by a Cronbach's alpha of .711. However, the scale had a good internal consistency with a new Cronbach's alpha value reported of .800, after the item number 1, 2 and 7 were removed from the scales.

3.5 Case Study Methods

It was explained earlier under a topic of research design in this Chapter (see Section 3.3.1 and 3.3.2), a completion of analysis from questionnaire surveys in the first phase of study was followed by a case study strategy. Among several QUAL approaches that have been used for a rich, diverse and complex data (Bazeley & Jackson, 2013), a case study was chosen to further research important issues of few cases intensively and holistically with multiple sources of evidence. According to Simons (2009 as cited in Thomas, 2016) case study is *an in-depth exploration from multiple perspectives of the complexity and uniqueness of a particular project, policy, institution, programme or system in a 'real life context'. It is research-based, inclusive of different methods and is evidence-led. The primary purpose is to generate in-depth understanding of a specific topic to generate knowledge and/or inform policy development, professional practice and civil or community action*. Similar to Yin (2011), his emphasis the compelling reasons to conduct case study research are to obtain an in-depth understanding of a single or small number of cases based on real-life circumstances. Thomas (2015) simplifies case study methods as a type of research that only focus on one thing in detail but from many angles.

Malaysian owned, and operated garment companies were selected as cases in this study. This strategy provides deep understanding of the issues investigated that relate to quality management as a system adopted in the garment industry which involved peoples and processes at the same time. It was believed that a case study strategy employed in the second phase of research enable the main issues highlighted from the online survey to be explained further by selected participants who are involved in the industry. Their feedback is extremely important and valuable as they have utilised the quality systems and have experienced the challenges in the adoption of a quality management system (QMS). As mentioned by Poksinska et al. (2006), the reliance on questionnaire surveys in a single study provides a limited understanding of the aspect of implementation of a QMS. Therefore, case study strategy is the most suitable method of data collection to address the explanatory research questions of this research. Table 3.2 presents a summary that outlines the differences between the case study and survey methods of research.

Table 3.2 Comparison between the case study and survey methods (Hammersley and Gomm, 2000; Thomas, 2015)

	Case Study	Survey
Investigates...	one case or a small number of cases	a relatively large number of cases
Data collected and analysed about...	a large number of features of each case	a small number of features of each case
Study of...	naturally occuring cases where the aim is not to control variables	naturally occuring cases where selected to maximise the sample's representativeness of wider population.
Quantification of data...	is not a priority	is a priority
Using...	many methods and sources of data	one method
Aiming to...	look at relationships and processes	look for generalisation

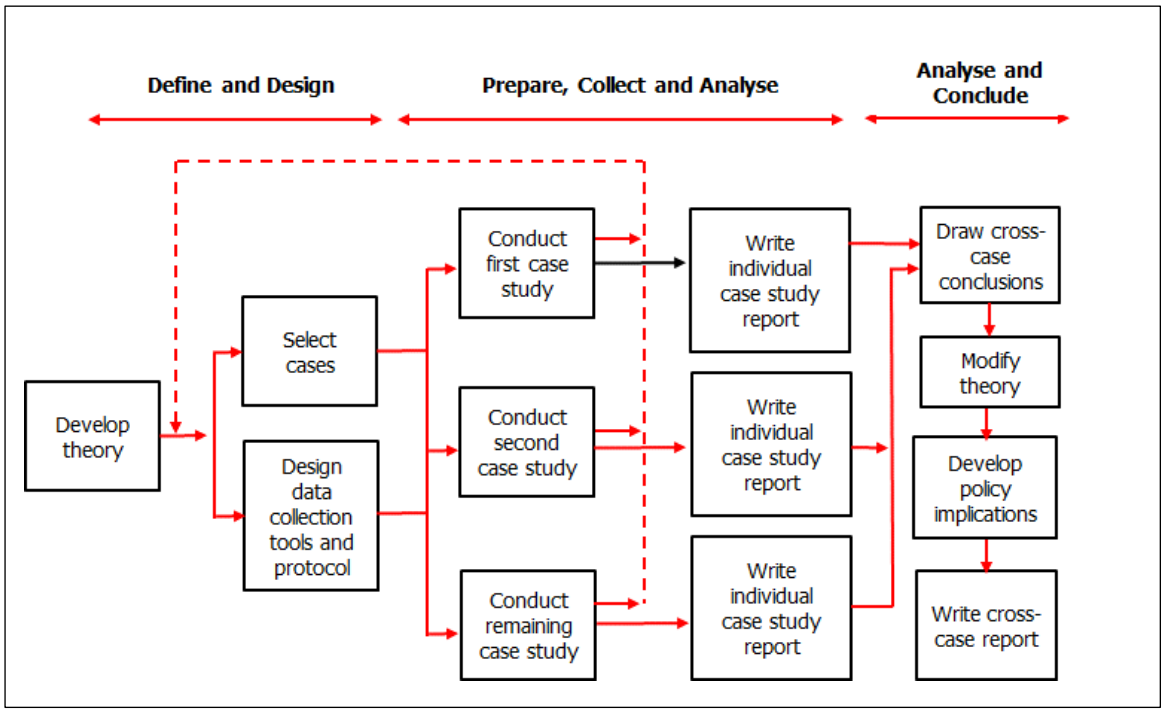
According to Yin (2013) this method is ideal when *how* and *why* type of questions need to be answered. Yin (2013) also suggests a series of stages (see Figure 3.6) involved in developing a case study, which normally begins with the theoretical issues or proposition. However, either single or multiple-case chosen for fieldwork

data collection, this method should be conducted within a bounded system (Creswell, 2007) or in other words placing boundaries on a case (Stake, 1995; Yin, 2011 and Baxter and Jack, 2008). Boundaries should be based on time and place (Creswell, 2003), time and activity (Stake, 1995) and by definition and context (Miles & Huberman, 1994).

3.5.1 Multiple–case Study Designs

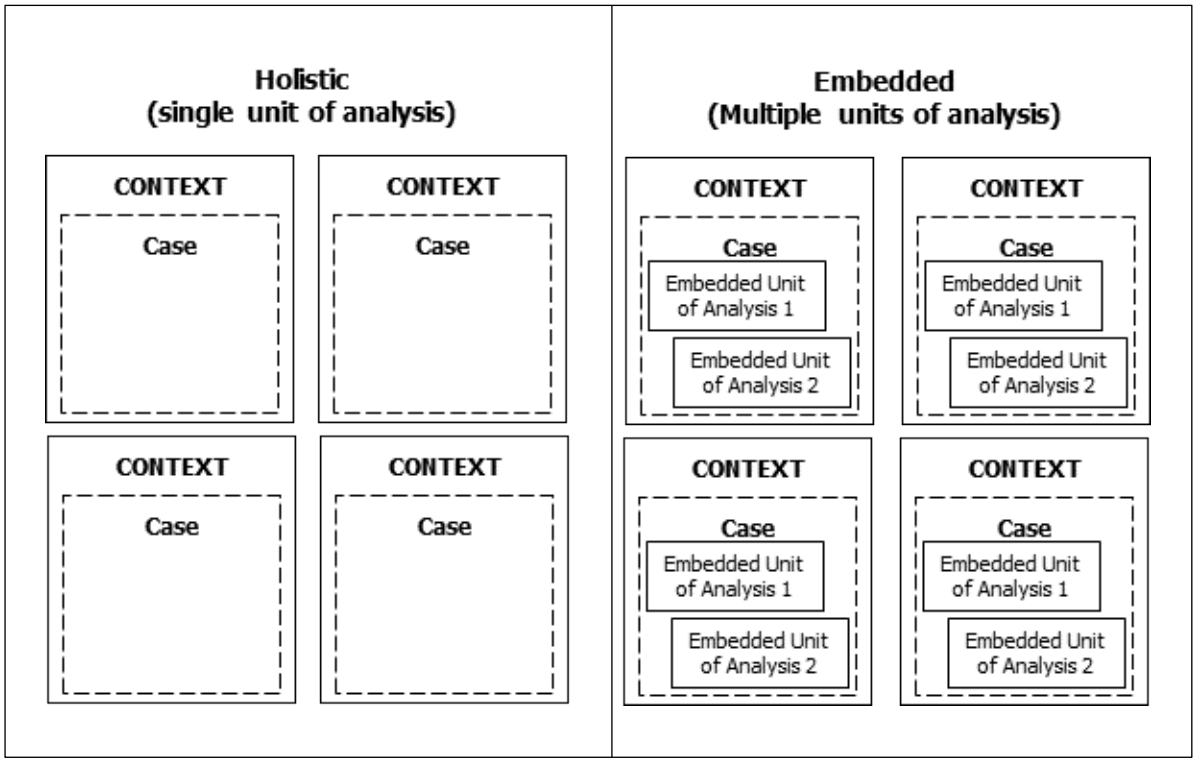
Case study design can involve single and multiple cases. According to Gray (2014), deciding the unit of analysis either single or multiple cases is essential in the process of designing case study procedures. This case study employed multiple case study to obtain data from each participating company. The selection was made according to the research questions and the resources that were available in conducting a study (Abdullah, 2007). Additionally, the case study that contain more than a single case enable the cross-case analysis to be carried out to derive the differences and similarities aspects among the researched cases (Baxter & Jack, 2008). Given the above reasons, multiple case designs were preferable compared to a single case design. Between two types of designs for multiple case studies that have been proposed by Yin (2013), multiple case (holistic) design was chosen instead of multiple case (embedded) – (see Figure 3.7).

Figure 3.6 Multiple case study method (Yin, 2014)



Yin (2013) draws a clear distinction between multiple holistic cases and multiple embedded cases. This study concerned with a similar topic of a case study and the multiple cases can produce both similar (a literal replication) and contrasting results (a theoretical replication) by using a replication logic. Adding to this, Gray (2014) mentions, one of the advantages of multiple case studies is replication of the procedures of one case across several cases prior interpretation of the findings begins. The concept of replication in multiple case studies is similar with the multiple experiments that are conducted repeatedly before the final conclusions achieved from the analysis (Tobi, 2014). According to Tobi (2014), replication of the findings from each case, by using multiple sources of information can provide findings that are worthy for further investigation or interpretation. Replication of multiple case studies is illustrated in Figure 3.8. Each data source which represents an individual case contributes to the researcher's understanding within context being studied and add strength to the findings (Baxter & Jack, 2008).

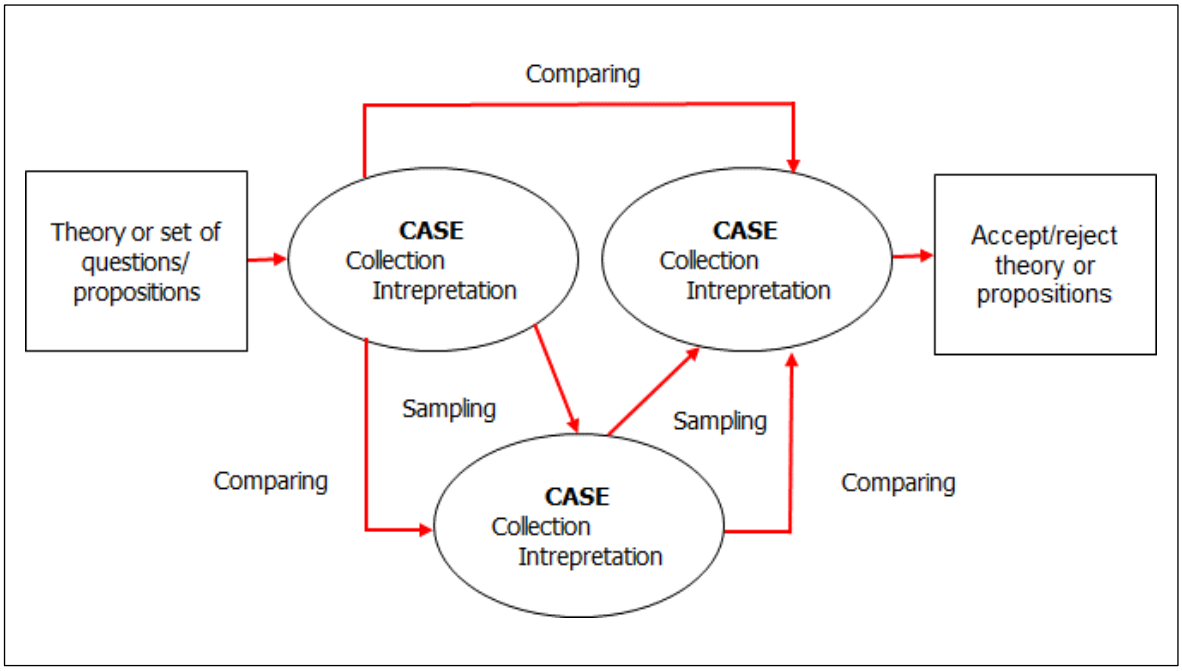
Figure 3.7 Types of designs for multiple case study (Yin, 2013)



In this case study, multiple cases enable the QM issues were explained from a viewpoint of different RTW garment manufacturers. It was believed that multiple case (holistic) represented a robust strategy to generate QUAL data that help towards the development of quality assurance framework for RTW garment manufacturing industry in Malaysia. As reported by Gable (1994), multiple case studies not only for description, but it also allows both theory building and theory testing as the intent of the research.

The case study protocol needed to be prepared and developed prior to fieldwork. Although there are no true and false procedures in conducting a case study research, the protocol itself can increases the reliability of the research and provides a guideline to carry out the data collection from each case study (Yin, 2013). Besides, the case study protocol also contains all necessary elements of case study research from the beginning until the final stage of data analysis (Zucker, 2009).

Figure 3.8 Replication in multiples cases (Flick, 2009 and Gray, 2014)



For this case study, the protocol was developed following the case study protocol outlined by Yin (2013). According to Yin (2013), a case study protocol should include the following elements:

- An overview of the case study project
- Field procedures
- Case study questions
- A guide for the case study report.

The overview or introduction to this case study was summarised in a statement about the research which was included in an official letter of invitation sent to the selected companies. For data collection procedures, case study design and the unit of analysis were identified earlier prior to establishing a data collection plan. This was explained briefly in Section 3.5.1. Initially, each company was contacted via telephone for the invitation to participate in the case study research. Once the verbal agreement was received, a letter of permission to conduct research (See **Appendix 5**) was sent to the company's representative together with a reply form (See **Appendix 6**). Subsequently, after the company returned a complete reply form as a sign of approval to the request, a one-page plan of visit was emailed to them as a schedule of data collection plan for the company's reference. Nevertheless, the actual date of visit was notified few days after they reviewed a data collection plan. A plan of visit was comprised of several elements such as a day and time allotted for the fieldwork, data collection activities, personnel involved, and the required documents needing to be reviewed (See **Appendix 7** for a complete plan of visit).

When a plan of visit was sent to the company's representative, the potential participants who were among the senior management understood the process of data collection and the length of time required to accomplish the fieldwork. Therefore, an appropriate time arrangement can be made, so as the right personnel for the interview session can be appointed. All fieldwork to selected companies were carried out from May to July 2015, by using the same data collection procedures. Among all case studies companies, Company B was chosen as a pilot case study because of the positive feedback and fast response to the case study invitation. According to Qiu (2009), pilot case study offers several advantages prior to the actual fieldwork in term of the appropriateness of data collection plan, the interview

questions, other methods for data collection, and provide an opportunity to experience different style of interview skills and techniques. Therefore, a case study plan for the main fieldwork can be revised and refined accordingly to give much focus in obtaining the required information.

3.5.2 Multiple–case Study Selection

Before such fieldwork begins, it is important to identify and select cases that represent the polarise findings from the quantitative survey. As mentioned earlier in Section 3.5, each individual case in this study was Malaysian garment manufacturers who volunteered to participate in this research. The study covered six (6) garment companies which located in the industrial zones and town of Kuala Lumpur, Selangor, Kelantan and Perak for in-depth investigation. These research sites represented companies in Central, Northern and East Coast region of Malaysia.

The selection of six cases was made according to number of cases have been suggested by scholars. According to Yin (2015, p.95), *there is no formula for defining the desired number of instances (or sample size) for each broader or narrower unit of data collection in a qualitative study*. Thus, it can be noted that there are no fixed numbers of cases for multiple case studies. Rowley (2002) and Yin (2013), a number of six to ten cases are typically suitable for multiple case studies. Meanwhile, Creswell (2015) recommends five to six cases works well for multiple cases which is similar to with Gable (1994) who suggests six cases for both pilot and multiple case studies. Furthermore, Eisenhardt (1989, as cited in Gray, 2014), mentioned the ideal number of cases should be between four and ten cases. Therefore, the number of cases used in this study can be considered sufficient to obtain different patterns of literal and theoretical replications which offered analytic benefits to the research (Rowley, 2002 and Yin, 2013).

As small samples were involved, all six cases were selected using the purposive sampling method, which is appropriate for multiple case study research (Meyer, 2001; Gerring, 2006). Each of the cases was selected purposefully on the basis that they able to provide the most relevant data and in-depth information in the topic of study (Yin, 2016). According to Gray (2014), each individual case, for instance a people, events or settings is chosen because they are information-rich cases who can supply the required information needed by a researcher. This type of sampling

strategy is useful to describe and explain a phenomenon or a development of theory in the area of which only a little is known (Kumar, 2011).

The selection criteria of each case were according to the key findings obtained from the quantitative survey in the first phase. According to Creswell (2014), key findings could be significant results relating variables, insignificant results, extreme or outlier cases, or even demographics which needs explanations for further understanding. This multiple case study involved cases from three different groups that was derived from a crosstabulation analysis, depicted as multivariate table in Section 4.2 of Chapter 4 (see Table 4.8). A summary of the selection criteria of all cases is presented in Table 3.3. Based on these cases which represented three groups of respondents who participated earlier in the online survey, cross-case analysis was carried out because of replication in data collection procedures among the groups.

Table 3.3 Selection criteria of all cases

Category	Criteria	Main Purpose	Companies					
			A	B	C	D	E	F
Group A	- Export-oriented companies - Quality systems adopters - Large companies	To determine how these distinct groups implemented the company's quality management systems (QMS) and why they heavily utilised the control approaches for quality management.	✓	✓				
Group B	- Domestic-oriented companies - Quality systems adopters - Medium-size companies				✓	✓		
Group C	- Domestic-oriented companies - Non-adopters to quality system - Small-size companies						✓	✓

3.5.3 Interviews

An interview, according to Brinkmann and Kvale (2015) is a process to obtain an in-depth information about a topic of mutual interest from the subject's point of view, through a planned conversation with selected peoples purposefully to understand a phenomenon, prior to scientific explanations. Yin (2003, p. 90) states that *most commonly case study interviews are of an open-ended nature, in which you can ask key respondents about the facts of a matter as well as their opinions about events. In some situations, you may even ask the respondent to propose his or her own insights into certain occurrences and may use such propositions as the basis for*

further inquiry. It can be understood that peoples may use their experiences, knowledge and perceptions to respond to the interview questions. Therefore, Yin (2003) suggests the people involved in the interviews can be considered as informants rather than respondents. Nonetheless, Creswell (2007) reminds a researcher should create a suitable setting for the interview session to encourage participants to share ideas, without of unpleasant feeling to convey the information. According to Creswell (2007), this can be achieved by determining places that are free from distractions and refine the interview questions through the pilot case study.

A one-on-one interview with designated personnel from both managerial and operational levels was undertaken for the main data collection in this case study. The interviews were semi-structured as it was chosen to engage each participant in a topical discussion (Yin, 2015). A complete list of open-ended questions was designed as an interview protocol (Creswell, 2007) and was referred during the interview. The semi-structured interview questions composed of four main parts as according to the quality management (QM) themes used in the questionnaire survey as shown in Table 3.4. The main reason was all themes such as quality assurance, quality control, and the inspection processes are integral approaches for QM practices in the garment manufacturing industry. All questions in each section were purposely constructed to understand the process involved for QM practices in each participating company. Table 3.4 summarises the questions designed for a case study interview. However, the complete list of interview questions can be referred in two-page of an interview protocol which can be referred in **Appendix 8**. The interview questions were organised sequentially based on the QM themes used for the questionnaire to guide a researcher to gain information within its scope and context. However, two-way interactions between a participant and the interviewer to discuss any interesting issues from the main questions were also considered to be recorded.

Meanwhile, the participants who were involved as an interviewee or informant which represented their companies respectively can be referred to Table 5.3 in Section 5.2 of Chapter 5. They were among the key persons in the organisation provide important insights into a case (Yin, 2011).

Table 3.4 Summary of the semi-structured interview questions

Interview Questions			
Title/ Themes	**No. of questions**	**Description**	**Interviewee**
Quality Assurance (QA)	1 - 7	The first theme was concerned with the process control activities which was perceived as dominant in the garment industry and the adoption of QA systems in their company. Interviewee was asked the processes involved and their personal opinion regarding the implementation of QMS in their company.	Human Resource Personnel / Head of QA/ Head of HR/ QA Executives/ Supervisor
Quality Control (QC)	8 - 17	This theme focused on the understanding of the QC as a support process in the garment manufacturing. The questions were related to the function of QC deparments, quality standards and specifications used, the inspection procedures or SOP, the major quality problems, Key Performance Indicator (KPI) for QC and customer complaint.	Head of QAQC Executives/ Supervisor
Sampling for garment inspection	18 - 21	The theme was concerned with the use of AQL-based sampling for garment inspection and other sampling methods adopted for non-AQL companies. The questions were designed to understand the importance of AQL, the procedures of AQL-based sampling and the sampling strategy utilised by non-AQL companies.	Head of QAQC Executives/ Supervisor
Others (Inspector's job scope and experiences)	22 - 27	This final theme was labelled as others because the questions incorporated QA, QC and the sampling inspection to be answered by the inspectors who made their own judgement and evaluation of garment's quality. The questions were specific to their job scope and experiences as a QC inspector, whereas the use of documentations and training were also included.	QC Inspector

During the interview, there were participants who elaborated the issues beyond expectation. Hence, in this case the interviewer utilised semi-structured interviews which offered flexibilities in interviewing questions depending upon the context of the discussion (Kumar, 2011). As a result, an in-depth understanding of the research subject can be achieved (Abdullah, 2007). Each interview took approximately one to two hours to complete after consent was obtained from the interviewee (see **Appendix 9** for a signed consent form). All responses from the interviewee were audio recorded as well included note taking for further data analysis.

3.5.4 Additional Methods

Yin (2015, p.150) states, *observing can be an invaluable way of collecting data because what you see with your own eyes and perceive with your own senses is not filtered by what others might have reported to you or what the author of some document might have seen. In this way, your observations are a form of primary*

data, to be highly cherished. According to Yin (2013), a good case study comprised of multiple sources of evidence that assists in data triangulation. Triangulation as referred to Gray (2014) is a combination of several qualitative methods or a combination of both quantitative and qualitative methods in a single study. The use of several methods leads to a development of converging line of inquiry which would make the evidence stronger (Yin, 2013). In addition, Yin (2013) also mentions the multiple sources of evidence can provide multiple measures of the same phenomenon, hence it allows a researcher to address any issue of construct validity.

In this case study, non-participant observation, documentations and records were used together with the semi-structured interviews to perform data triangulation. According to Kumar (2011, p.141), non-participant observation refers to a situation when a researcher does not get involved in the activities of the group but remain a passive observer, watching and listening to its activities and drawing conclusion from this. Non-participant observation was undertaken after the main interviews with the key person. For this case study, the inspection processes in the main production of RTW garments were observed to follow-up the findings from the interviews. The observation took place in the sewing assembly line with the aid of an observational protocol to record the required information as the observation evidence (Creswell, 2007). The protocol, also known as a formal observational instrument (Yin, 2011), was designed as a guideline for data collection procedures and it contained a check list of the main activities of process control in both sewing and finishing department (See **Appendix 10** for Observational Protocol or Check list). Like the interview questions, the content of the protocol was revised accordingly after a pilot case study.

In recording observations, considering the purpose of this method, and the type of population being observed (Kumar, 2011), narrative and categorical recording were used to design an observational protocol. Both methods of recording an observation were used in a one-page check list because it offered choices when recording the elements needing to be observed. Thus, the elements contained in the protocol were classified using categories (Kumar, 2011), together with an additional column that was included for the open-ended answers to the questions (Yin, 2011). This was

designed to ease to making brief or detailed notes if the categorical recording was not sufficient to describe the situation.

Another source of evidence collated during the field visits was derived from the selected documentation and records from each case study companies. It is important to review several documents and records as sources of secondary data for data triangulation. According to Yin (2013), reviewing documents in doing case studies bring several advantages to case study research. Adding to this, Yin (2013) states that the use of documents is helpful as a verification of inputs obtained during the interviews and can provide additional information to augment evidence from other sources (Yin, 2013). Creswell (2014) also mentions the documents can represent useful data to which the participants highlight during the process of data collection. Nonetheless, the main strength of the documents as written evidence is that it can be reviewed repeatedly at a time convenient to researcher (Creswell, 2014; Yin, 2013).

For this case study, the availability of organisational documents was the evidence of the QM practices in each participating company. It can be understood that the ISO-certified companies have established good documentation systems as a requirement of the international standards. Therefore, documents and records should be used to fit the purpose, maintained and updated continuously. The available documentation in this case study reflected the actual practices of QM throughout the company. To ease the process of reviewing the required documentation, a list of documents needed was included in the case study procedures (See again **Appendix 6** for Plan of visit). Hence, the participants from each company could expect the types of documents needed in this research before it was made accessible to researcher.

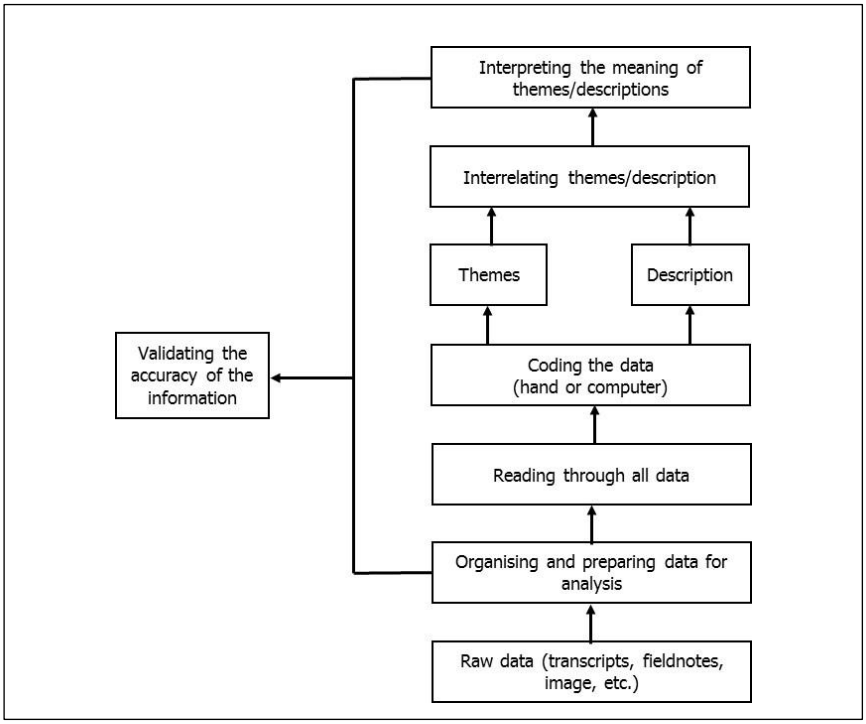
The raw data collated from multiple sources of evidence developed a case study database required for this research. According to Yin (2013), a formal case study database comprised of case study field notes, key documents, tabular materials and narratives. All this evidence should be organised and stored effectively as a part of the database. In this case study, the field notes which including the data collection protocols, photographs, and audio files were assembled, compiled and stored in a form of computer files. Additional written notes from the interviews, direct observation and copies of documents retrieved from the case study companies were

also stored in a hardcopy filing. The case study database was maintained for easy retrieval when it was needed by the researcher. As the use of multiple evidence or triangulated methodology (Meyer, 2001) could increase the validity of the information collated for this research (Soltani et al., 2011), the case study database may improve the reliability of the research as the raw data are available for independent inspection if applicable by other researchers (Baxter & Jack, 2008).

3.5.5 Data Analysis for Case Study

A qualitative data analysis depends upon how the researcher plan to convey and communicate the findings to the reader (Kumar, 2011). Despite the case study evidence that are dense and rich, it is important to carefully winnowing the data, so that the analysis and interpretation of the key findings can be much focus to achieve the aims of the research (Creswell, 2014). The goal of data analysis in qualitative study is to interpret, to understand and able to explain the data (Gray, 2014). Thus, case study usually begins with a detailed description of the setting or individual, before further data analysis for themes or issues are carried out (Creswell, 2014). For this case study, the process of data analysis was based on the sequential procedures suggested by Creswell (2014) as depicted in Figure 3.9, relying on theoretical propositions as analytic strategy for explanation-building (Yin, 2013).

Figure 3.9 Case study analysis (Creswell, 2014)



Before the main analysis was carried out, the audio recorded interviews were transcribed using NVivo 10 software for qualitative analysis. However, researcher decided to conduct the process of coding the data manually, as this was equally adequate and also convenient. Sections of text were coded by segmenting sentences, paragraphs and images into categories with appropriate labelling (Creswell, 2014). In forming codes across the entire data set, the coded segments represented the important aspects of QM implementation highlighted by each interviewee according to the themes utilised in the survey questionnaire. Table 3.5 shows the coding process that was conducted based on a list of semi-structured interview questions and responses. The sample of interview excerpts below were extracted from the interview session with Company's A Head of QC.

Table 3.5 Coding data

Semi-structured interview questions	**Interview answers** Interviewee: **Head of QC Company A**	**Codes**	**Themes in survey questionnaire**
Why **inspection** has been considered as the most important and useful quality approach in garment industry?	*"Some international buyers require us to do quality inspections. Before they confirm the order, they need to conduct a factory evaluation in order to know how we manage the resources. So, it's important to check the product along the production due to the requirements of different buyers."*	Quality programme Inspection	Quality Management System (QMS) and practices
I noticed that you put too much reliance to quality control activities, such as **inspection** from the stage of receiving raw materials until finished goods. Can you explain this?	*"All bundles were put inside the trolley and sometimes in the poly bag and they will send it to other departments for next operation. After an operator open one bundle, few pieces of garments were put down on the floor. How could you be sure the garments are free from stain? What should the operators do? Sew or re-work? of course, they want to concentrate with sewing"* *"If you go to production, you'll understand the process. I cannot control the stain. But how to avoid? The bundles were transported to upstairs and downstairs so many times. I could not guarantee my quality 100% perfect."*	Quality programme Inspection Problems during production	Quality Control (QC)

As the interview questions were designed and organised into different themes related to the concept of QM, a combination of predetermined and emerging codes from the transcriptions were used for thematic analysis (Creswell, 2014). Codes were collated into potential themes or sub-themes, grouped together according to themes and refined (Gray, 2014). The main pattern of QM practices in each case study companies was further analysed by using both a 'within-case' and 'cross-case' analysis, referred by Yin (2013) as analytic techniques. Table 3.6 shows how the identified themes linked to human factors in the survey analysis.

Table 3.6 Identified themes linked to human factors

Interview answers	Codes	Themes in survey questionnaire	Root cause of QM issues
General Manager of Company C *"Are we living in an environment where **people most of the time follow rules and requirements with a positive mind set**? Surely QMS (ISO standards), would help to increase the awareness of our workers towards quality and remind them that somebody is going to audit us."*	Mentality of employees	Quality Management System (QMS) Quality Assurance (QA)	Human factor
Business Owner of Company F *"In this industry, we have dealt with variability of resources required for the manufacturing. First, we were utilised varieties of fabrics, accessories, design and sizing. Second, **we also relied upon the skill of man power for sewing operation, who was not consistent with each other** and may lead to a possibility of poor handling. Finally, we have different customers as well, who possess their own specification associated with materials, style and design of each clothing line. Hence, all of these factors were reasons that made inspections such a useful process for garment manufacturing."*	Quality programme Inspection	Quality Control (QC) Inspection	Human factor
HR Manager of Company D *"The challenging aspects to implement QMS are when **the foreign workers are not able to read the procedures or the work instructions** when either it was written in English or Malay language. They even do not know how to record any data and use the computer. They are only experts in using the sewing machine, as whenever countries they travel to work, they will do the same thing, which is sewing."*	Issues with foreign workers	Quality Management System (QMS) Quality Assurance (QA Quality Control (QC)	Human factor
HR Manager of Company B *"This is our **senior management's decision to stop the renewal of QMS** and cancel the re-certification. I would say that ISO is important for us too, but if this is what the senior management want for the company, we have no objection"*	ISO certification renewal	Quality Management System (QMS) Quality Assurance (QA	Human factor

The within-case analysis was first carried out to identify the main features and limitation of each case study company, whilst the cross-case analysis helps to determine the commonalities and peculiarities of each of the different cases (Brun and Moretto, 2014). One of the techniques used for cross-case synthesis was using either tables or diagrams to summarise and compare the QM data from each company (Qiu, 2009). According to Yin (2013), the data from the individual cases can be presented in a word tables, capturing all cases involved in the research in a uniform framework. Therefore, in presenting the analysis in Chapter 5, the data was organised and summarised in tables, so that the similarities and differences within the criteria being observed from each case study company can be understood. The interpretation of all findings that was simplified in a form of various themes, together with the entire collection of tables led to the cross-case conclusion, which contributed to theory building in this research.

3.5.6 Reliability and Validity of the Case Study

Other aspects in qualitative research which need attention are the issues of validity and reliability. Qualitative validity as defined by Creswell (2014) is the process of ensuring the accuracy of the findings by employing certain procedures, while reliability according to Gibbs (2007, cited in Creswell, 2014) is referring to the consistency in approaches utilised by different researchers and different projects. Kumar (2011) has cited four indicators that reflects validity and reliability in qualitative research as proposed by Guba and Lincoln (1994) which are credibility, transferability, dependability and conformability. The meaning of each indicator as compared to quantitative validity and reliability is shown in Table 3.7.

Table 3.7 Criteria for judging quantitative and qualitative research (Guba and Lincoln, 1994; Trochim and Donnelly, 2007: 149 as cited in Kumar, 2011)

Traditional criteria for judging quantitative research	**Alternative criteria for judging qualitative research**	
	Criteria	**Meaning**
Internal validity	Credibility	Credibility involves establishing that the results of qualitative research are credible or believable from the perspective of the participant in the research .
External validity	Transferability	This refers to the degree to which the results of qualitative research can be generalised or transferred to other contexts or setting
Reliability	Dependability	It is concerned with whether we would obtain the same results if we could observe the same thing twice.
Objectivity	Confirmability	This refers to the degree to which the results could be confirmed or corroborated by others

Besides the criteria proposed as above, the issues of these concepts in qualitative are still debatable and controversial, considering the flexibilities of the research procedures in qualitative research as compared to quantitative (Kumar, 2011; Thomas, 2015). Although Kumar (2011) has discussed the criteria mentioned by Guba and Lincoln (1994), he then concludes that it is difficult to establish validity and reliability based on the indicators proposed by Guba and Lincoln (1994). Similar stances supported by Gray (2014) and Thomas (2015) as they argue the appropriate techniques to assess qualitative validity and reliability due to a tendency to use either single or several cases in a case study research. In addition, Kumar (2011) also argues how validity and reliability concepts can be applied in qualitative research when unstandardized and unstructured procedures are utilised during the process of data collection.

In this situation, although the importance given to the concept of reliability and validity in qualitative are not as much as in quantitative research, ensuring qualitative validity and reliability in the process of data collection and analysis are the strength of qualitative research (Creswell, 2014). Therefore, for this case study research the tactics or tests proposed by Yin (2013) were referred to as a guideline to validate the findings in this research. Yin (2013) identifies four tests for demonstrating validity at the stage of data collection and analysis of a case study research. Four case study

tests are known as construct validity, internal validity, external validity and reliability. Table 3.8 summarises the case study tactics used to establish validity and reliability in this research.

Table 3.8 Case study tactics for validity and reliability (Yin, 2013)

Tests	Case study tactics	Phase of research in which tactics occurs
Construct validity	Use multiple sources of evidence	Data collection
	Establish chain of evidence	Data collection
Internal validity	Do explanation-building	Data analysis
External validity	Use replication logic in multiple-case studies	Research design
Reliability	Use case study protocol	Data collection
	Develop case study database	Data collection

3.6 Summary

Overall, this chapter explains the methodological strategies taken towards data collection and analysis that was carried out based on the mixed methods approach to achieve the research aims and questions. Both research strategies, questionnaire survey and case studies were described sequentially in separate sections. Each strategy comprised information on how it was designed, the rationale for its selection, how it was conducted, who was involved, data analysis techniques and the tests used to establish validity and reliability of the research design. The use of multiple sources of evidence in case study research helped to triangulate the findings obtained earlier from the survey. The results gained from both strategies were presented in Chapter 4 and 5 of this thesis.

CHAPTER 4

SURVEY RESULTS AND ANALYSIS

4.0 Introduction

This chapter presents the findings from the survey that was used to collate information on the quality management practices in the Malaysian garment manufacturers, which covers the following three key areas; the quality systems and programmes, quality control (QC) and types of inspection, as well as the sampling procedures for garment inspection. The responses from 31 respondents were summarised according to each section in the survey. The first section of this chapter begins with a description of the organisational and individual profile of respondents who participated in this study. The second section will present the results of quality management system (QMS) practices in relation to the accreditation to quality system and quality approaches that have been utilised in the garment industry. The third section will discuss the process of quality control that have been implemented by manufacturers, including the methods of inspection and problems identified during garment production. The last section will review the use of AQL-based sampling and other sampling procedures chosen for garment inspection.

Further analysis was carried out using the crosstabulation to explore and better understand the categorical variables used in the survey. It also helps to examine how the survey items could be interrelated and refine the data. The bivariate crosstabulations were produced from a different set of variables, and the overall results were summarised as a ‘data dredging’ (Kent, 2015). Kent (2015: 152) describes ‘data dredging’ as a metaphor for a process of ‘trawling’ a data set without a specific hypothesis to test, or perhaps even without hunches or specific issue to pursue. The main reasons are to see what patterns emerge and any interesting findings or new insights that require further investigation (Kent, 2015). Hence, this analytical process provided clues and navigated researcher to understand the results and decide which elements should be brought forward for in-depth study. Therefore,

the analysis from this chapter will elicit several issues for further investigation and to determine six organisations that should be invited again as participants in this study.

All the survey findings were explained in accordance to answer the research questions and to achieve the objectives before any decision taken to proceed with the case study.

4.1 General Descriptive Statistics of Respondents

4.1.1 Background of Respondents

A descriptive analysis was carried out to report the organizational and individual profile amongst the companies that were involved in this study. Table 4.1 provides a summary of the company's background on the Malaysian garment manufacturer's involvement in the mass production of garments.

The background of participating companies was diverse in terms of the criteria's shown in Table 4.1. More than half of the respondents (71%) have been operated less than 20 years in business. The highest percentage (56%) of respondents involved was from the state of Selangor and Kuala Lumpur, which was located in the central region of Malaysia. The textile directories provided by the manufacturer association and sources from Malaysia government agency website have shown that the central region of Malaysia seem to be a preferable location for manufacturing plants. All respondents supply different categories of clothing in the market, whereas the top three products were work clothes and uniforms (29.0%), women's wear (22.6%), casual clothing and sportswear (19.4%). Out of 31 respondents, 71.0% supply the products to the local market and most of the respondents (65.0%) were small and medium–sized companies. Meanwhile, the remaining nine respondents (29.0%) were involved in the export market and were large companies that supply the bulk orders to the international customers. The results also include two respondents (6.5%) with well-known brand of women's wear, that were micro-sized companies and contract out their orders to be produced by local manufacturers for Malaysian customers.

Table 4.1 Company's background

Items	Frequency	Percentage
Number of years in operation		
Less than 10 years	11	35.5
10 but less than 20 years	11	35.5
20 but less than 30 years	4	12.9
30 but less than 40 years	4	12.9
Over 40 years	1	3.2
Location of production divisions/plant (Region)		
	17	56.0
Central (Selangor, Kuala Lumpur)	4	12.0
Southern (Johor)	6	16.0
Northern (Perak, Pulau Pinang, Kedah)	3	12.0
East Coast (Kelantan)	1	4.0
East Malaysia (Sabah)		
Company's main product		
	9	29.0
Work clothes & uniforms	7	22.6
Women's wear	6	19.4
Casual clothing & sports wear	3	9.7
Knitwear	3	9.7
Men's wear	2	6.5
Undergarment	1	3.2
Swimwear		
Market		
	22	71.0
Domestic	9	29.0
International		
Category of Company		
	12	38.7
Small-sized Enterprise	10	32.3
Medium-sized Enterprise	7	22.6
Large	2	6.5
Micro Enterprise		

Note: Total companies n = 31

Table 4.2 shows information related to the manufacturing system utilised by the respondents. Almost all respondents (93.5%) were able to provide their customers with a full manufacturing process. However, due to certain limitations in cutting, sewing, printing, and embroidery processes, the sub-contractor services that specialised in the above-mentioned processes, were used to complete the whole production process. Commonly, respondents liaised with their preferred vendor or supplier for sub-contracting job. Consequently, the quality problems could be controlled and 'out of specification' products could be eliminated as the quality requirements were understood by the sub-contractors.

Sewing production system is a central component of any cut-and-sew operation (Kincade et al., 2013). In this study, 87.1% of respondents utilised progressive bundle system (PBS) to manufacturer garments. PBS is the system whereby the cut pieces of fabric, either unfinished or finished garments with the same measurement and size were tied and managed in the bundle with a ticket that contains the bundle information, move sequentially from operation to operation (Glock and Kunz, 2005). Each sewing operator completes the same task on each garment in the bundle before passing it on to the next operator. This production system has been known as a traditional choice (Lin et al, 1995; Glock and Kunz, 2005) and it was widely used for staple product lines and mass production (Lin et al., 1994).

When manufacturers are looking toward advanced technology to speed-up the company's throughput volume and time, production sewing systems such as the unit production system (UPS), modular or team-based production system and flexible manufacturing are the systems that have been employed to meet manufacturer's specific need (Glock and Kunz, 2005; Burns and Bryant, 2007: Rosenau and Wilson, 2007). The findings reveal that PBS is still a dominant concept of manufacturing amongst Malaysian manufacturers. The present finding is in agreement with Lin et al., (2002) and Kincade et al., (2013) who reported that PBS or bundle system has been the most common sewing production in the garment industry and is still widely used in many apparel plants today. Interestingly, two respondents (6.4%) claim that they have been using modular production and flexible manufacturing. However, to what extent the system was successfully used in their production, was not asked in the survey.

Table 4.2 Company's manufacturing system

Items	Frequency	Percentage
Company with full manufacturing process		
Yes	29	93.5
No	2	6.5
Company liaises with sub-contractor		
Yes	22	71.0
No	9	29.0
Types of sewing production system		
Progressive bundle system (PBS)	27	87.1
Modular production	1	3.2
Flexible manufacturing	1	3.2
Not applicable	2	6.5
Note: Total companies *n* = 31		

Table 4.3 exhibits the status of respondents that were responsible to provide a necessary feedback as required in the survey. Their position plays an important role to ensure the response given represented the exact situation in the company. The analysis shown that 83.9% of respondents were in the high-level management group, and 19.2% of them were the owner of the company.

Table 4.3 Individual profile of respondents

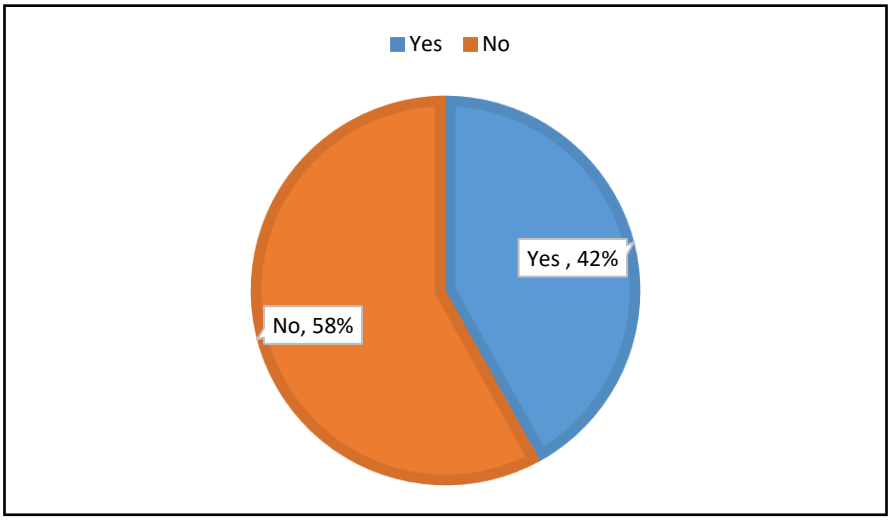
Items	Frequency	Percentage
Individual profile		
High level management	26	83.9
Middle level management	5	16.1
Note: Total companies *n* =31		

4.1.2 Quality Management Systems and Quality Improvement Programmes

The systems established in companies are adopted as a mechanism to make the process to become more efficient and well organised. No systems are created to add difficulties to the current process, otherwise the systems failed to be understood or misinterpreted by human. The same situation goes with the systems in quality management. A massive research in quality management systems (QMS) and standards have been conducted in many industries to review and determine the status of implementation, the problems or issues emerged and the recommendation so that the mechanism or any action plan of the systems can be improved from time to time (Yusof, 1997; Chen, 2005; Fatima, 2006; Abdullah, 2007; Battini et al. 2012; Coleman, 2013; Lee et al. 2013)

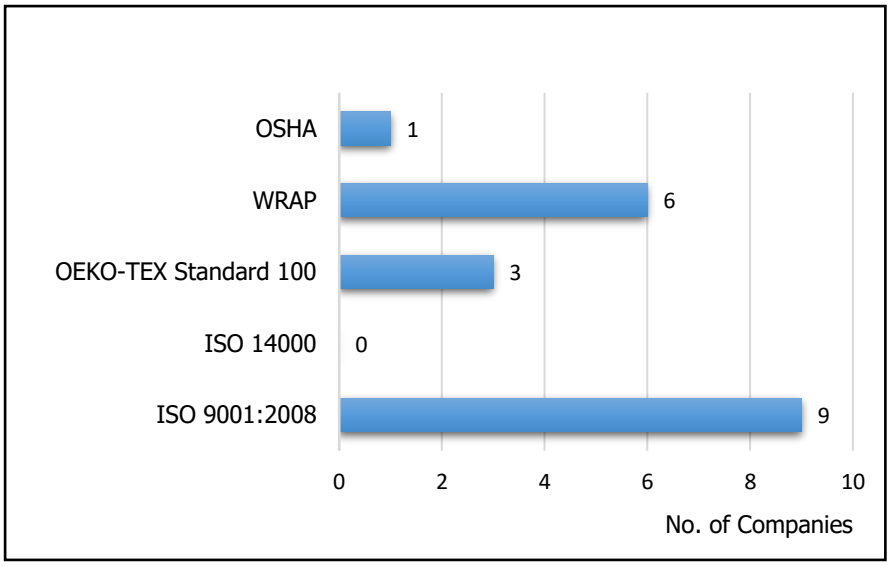
Garment industry has been one of the manufacturing sectors that utilised QMS for many reasons. The reliance to the source of main power for the production, has made the quality monitoring is extremely crucial and should not be neglected (Islam & Shazali, 2011; Zulch et al. 2011). The human factor has been critical in the textile and apparel manufacturing sector (Toft, 1996) and it seems the major problem faced by manufacturers involved in mass production. Therefore, the certification to QMS is always seen as the strategy to ensure the flow of materials and information between customers and suppliers are managed efficiently (Romano and Vinelli, 2001). However, the decision to be certified with any system, was usually influenced by customers with the self-awareness of top management to promote the quality culture in the company (Chowdhury, 2007; Mokhtar and Yusof, 2010). Analysis of the accreditation to QMS of Malaysian garment manufacturer can be referred to Figure 4.1 and 4.2.

Figure 4.1 Accreditation to quality system amongst companies



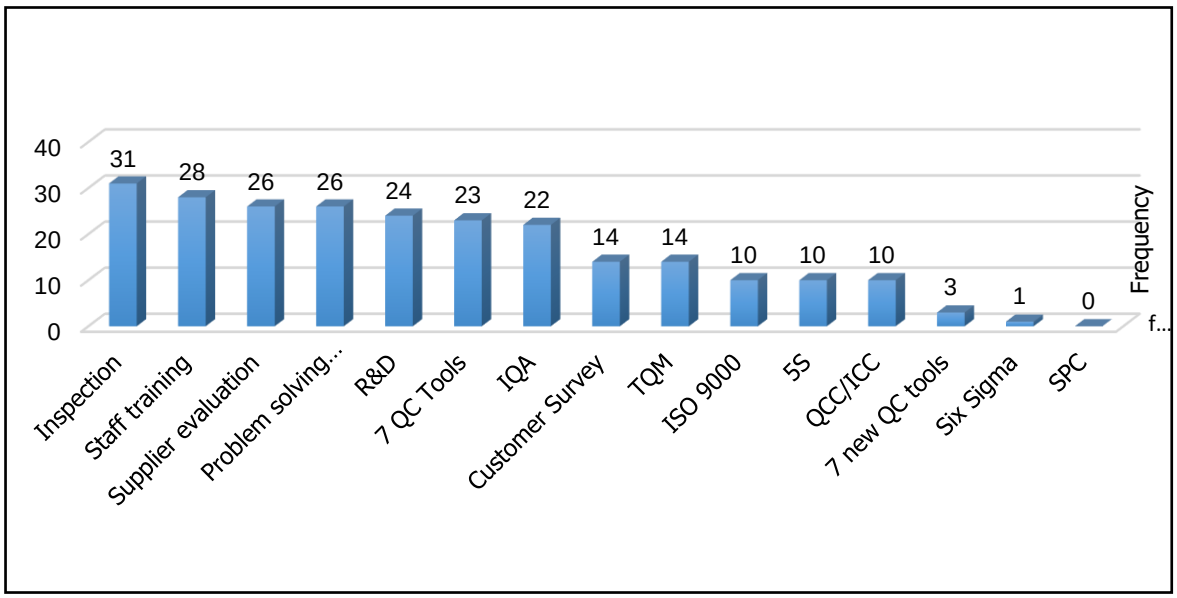
The above pie chart shows that, only 42% respondents have obtained the accreditation from the international quality systems. Almost half of them (46.1%) have implemented the system for less than five years. It seems likely to indicate that the adoption of QMS in Malaysia has been a new phenomenon within this decade. There has been similarities in the study conducted by Towers and McLoughlin (2005) about the adoption of a QMS amongst the textile manufacturers' base in the UK. Nonetheless, 58% of them were not certified to any QMS and majority of them (77.8%) are companies dealing with local customers. On the top of that, out of 13 respondents, 69.2% were ISO 9001 certified companies, while 46.2% of them obtained Worldwide Responsible Accredited Production (WRAP) compliance and 23.08% were certified by OEKO-TEX® Standard 100 (see Figure 4.2). The main reasons for these accreditations to the quality system were due to customer requirements (38.7%), and for improvement in the management process (32.3%). Hence, it is clear that ISO 9001 and WRAP have been widely used by garment manufacturers, particularly for export market compared to other quality systems. The result is consistent with Hasan et al., (2013) who reported on the implementation status of TQM practices in Pakistan's apparel industry.

Figure 4.2 Quality Management Systems



Regarding the implementation of quality, 71.0 % of respondents claimed that the quality department was established; whilst the remaining 29.0% of them asserted that, no such department had been responsible for quality. In realising the importance of quality management to sustain the desired quality standard for manufactured garments, the respondents were asked to rate, the frequency they have used the quality improvement programmes and tools that had been identified from the literature. The list of quality improvement programmes and tools as shown in Figure 4.3.

Figure 4.3 Quality management programmes in the Malaysian garment industry



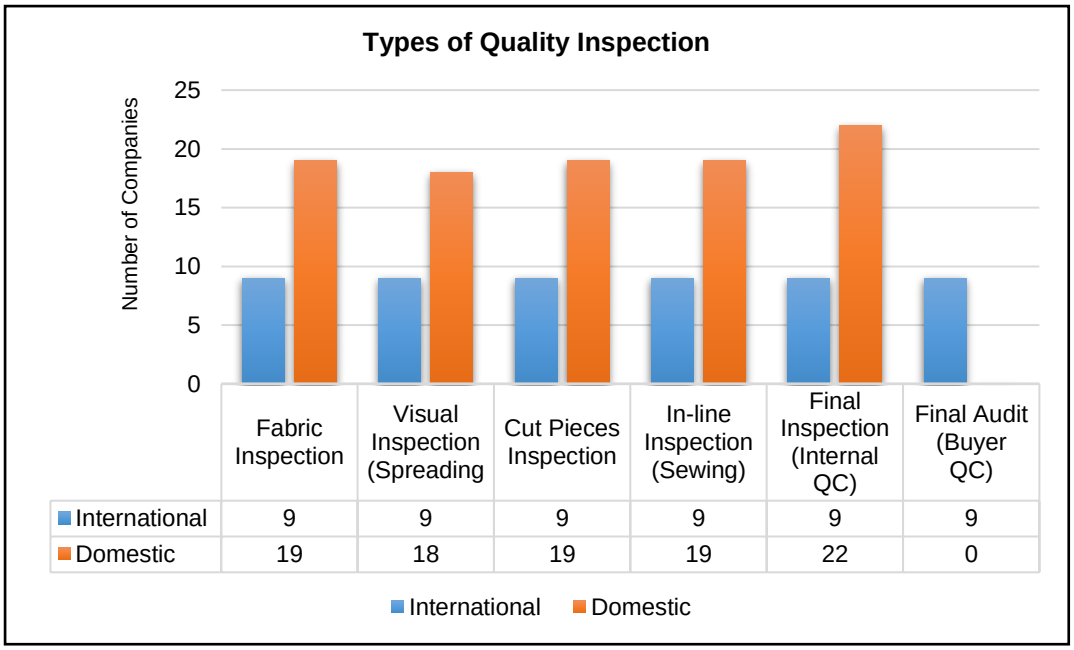
All respondents had chosen the inspection process as the most widely used quality management activities in their companies. Staff training, supplier evaluation, and problem-solving techniques were among the preferred approaches to quality chosen by the respondents. Meanwhile, the advanced quality approaches, such as seven new QC tools and Six Sigma, were almost not used at all, especially statistical process control (SPC). Hence, it seems reasonable to assume that Malaysian garment manufacturers did not fully operate in the TQM mode, with a limited and selective QM activities. This is also consistent with the findings reported by Fatima and Ahmed (2006) on the quality management practices in the Pakistan's readymade garments industry.

In this study, although 42% of respondents obtained QMS accreditation for their business, it does not guarantee that the process of managing quality in their companies always on a right track. Unexpectedly, 83.9% of respondents claimed that the implementation of quality in their companies has been challenging to be carried out. This finding might be one of the important issue that can be investigated further during the case study research.

4.1.3 Quality Control and Inspection Process in the Garment Industry

As the results obtained from the previous section (Section 4.1.2) provided evidence that the industry comprised of inspection-oriented companies, the respondents were further asked how the companies managed their quality control (QC). Figure 4.4 presents the types of inspections that were available on the respondent's manufacturing site. The bar chart depicts a result between companies dealing with domestic and an export market to show a comparison of quality inspection utilised by both companies. More than 80% of the respondents claimed that they conducted the inspection from the stage of receiving the fabrics until the garment parts were sewn in the assembly line. The final inspection was the most important quality process; before the finished garments reached customers, notably for firms that served local customers.

Figure 4.4 Types of inspection conducted by companies



Nevertheless, only 29.0% respondents used independent agent services that were appointed by the retailer for the final inspection of the garments due to their involvement in the export market. In this situation, the buyer QC would be assigned to examine the quality of the garments, and the shipment approval would be granted depending on the result of the inspection. It is deniable that quality is everybody's responsibility, but in the manufacturing sector, there should be an individual, independent of production that manages quality functions and reports to the highest level of management (Mehta, 2004). To conduct series of inspection in the manufacturing site, inspectors are assigned to check the garment's quality according to the quality standards and requirements. They are also trained to identify different categories of defects and step to be taken once the problem in the production has been detected. Table 4.4 show individuals who have been assigned to inspect the garments during production.

Respondents who utilise AQL-based sampling have a group of inspectors who are called in-line and end-line QC to monitor and control the quality of garments, while the buyer QC will conduct the final audit and make an assessment based on the overall quality of finished garments before the shipment is approved. Mehta (2004) states the ultimate decision whether to accept or reject the shipment is up to the respective buyer, with some merchandising consideration to accept a failed

shipment. Here, the role of independent agent appointed by the international buyer is very important during the final audit of garments as his or her evaluation and decision may dictate a shipment pass the inspection or otherwise.

Table 4.4 Individuals responsible for inspection

Individuals responsible for inspection	**AQL's company (10)**	**Non-AQL's company (21)**
In-line QC Inspector	10	11
End-line QC Inspector	8	9
QC Supervisor	5	7
Buyer QC (Independent Agent)	8	0
Others	1	13

Meanwhile, respondents who did not use an AQL for garment inspection have assigned either *in-line* and end-line QC or QC supervisor or other staff members who are not specifically worked in the quality department for inspection. The staff that responsible for quality inspection is not necessarily a quality controller or inspector, but he or she is someone who basically experienced in handling quality and acquired a good product's knowledge in the company.

This indicates that the respondents without an AQL requirement, were not imposed a tight quality standard compared to respondents with AQL. This might be due to the product supplied by the respondents, whereas they have been producing the same style, design and materials for different customers. Therefore, the process of inspection is not as thorough as required in the AQL's companies.

While conducting the inspection in the sewing section, quality inspectors will check randomly the quality of unfinished garments, and the inspection results will be recorded in a specific form or checklist available for that department. Commonly, the company that accredited with quality systems possesses a good management of documents and quality records. Therefore, the filed documents will provide evidence of the process and will benefit the company for the future references. It has been a

daily routine for inspector to record the defect found in the production, and the problems detected are from different sources. Based on experiences of the respondents, seaming defects (58.0%) and operator faults (61.3%), were problems that commonly found in the sewing assembly line (see Table 4.5). Nonetheless, fabric defects (76.4%), cutting defects (67.8%), machine breakdown (77.4%) and measurement that out of tolerance (67.8%) were seldom occurred during production.

Table 4.5 Problems in garment production

Problems	Not at all	Rarely	Sometimes	Most of the time
Fabric Defects	9.7% (3)	66.7% (21)	19.4% (6)	3.2% (1)
Cutting Defects	9.7% (3)	58.1% (18)	29.0% (9)	3.2% (1)
Sewing and Seaming Defects	3.2% (1)	38.7% (12)	54.8% (17)	3.2% (1)
Machine Fault	-	77.4% (24)	16.1% (5)	6.5% (2)
Sewing Operator Fault	3.2% (1)	35.5% (11)	54.8% (17)	6.5% (2)
Measurement is out of tolerance	6.5% (2)	61.3% (19)	32.3 % (10)	-

In addition, the respondents were asked to indicate the extent of their agreement level on a 5-point Likert scale based on the six statements developed for the inspection process (see Table 4.6). All respondents agreed that *inspection is an extremely important process in the garment industry* (item 1) and it is *the most suitable mechanism to prevent defective garments from reaching customers* (item 2). However, both item number 1 and 2 with item number 7; '*The inspector will check and inspect all parts of garments as according to the production and measurement specifications'* that listed in the survey were removed to improve the value of Cronbach's alpha from 0.73 to 0.8. Thus, it suggests a good internal consistency reliability for the scale with this sample (Pallant, 2010) by using only six items instead of nine before the reliability analysis.

Table 4.6: Level of agreement on inspection process amongst respondents

No.	Statement	Strongly disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
1.	The procedures and the workflow of the quality inspection can be accessed easily.	-	25.8% (8)	19.4% (6)	22.6% (7)	32.3% (10)
2.	Records of inspection are filed and kept within the retention period.	-	25.8% (8)	16.1% (5)	29.0% (9)	29.0% (9)
3.	Skill and experiences of quality inspectors are the main factor of an effective inspection.	-	-	-	12.9% (4)	87.1% (27)
4.	The appropriate sampling technique used for garment inspection is also the main factor of an effective inspection.	-	-	9.7% (3)	48.4% (15)	41.9% (13)
5.	The inspector will randomly take few pieces of garment parts for inspection during production.	-	6.5% (2)	-	16.1% (5)	77.4% (24)
6.	100% inspection is ineffective to be conducted during production and finishing, unless the acceptable quality level is not met.	-	22.6% (7)	29.0% (9)	29.0% (9)	19.4% (6)

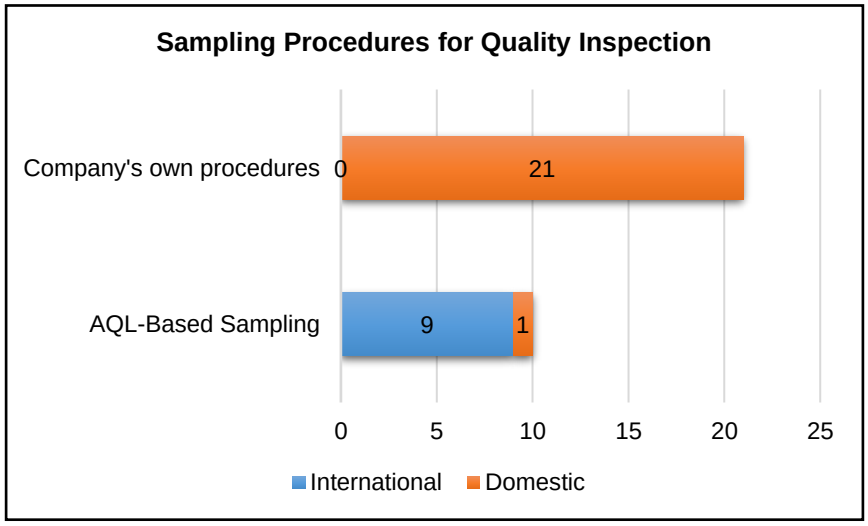
Half of respondents (54.9%) agreed that the procedures and the workflow of the quality inspection could be accessed easily and 58% claimed that records of inspection are filed and kept within the retention period. They also agreed that both skills and experiences of quality inspectors are the main factors of an effective inspection. In fact, 90.3% respondents claimed that the appropriate sampling technique could contribute to an effective inspection. In addition, almost all

respondents (93.5%) did the inspection according to the production and measurement specification, besides conducting random inspections for each sewing operation. Furthermore, 51.6% agreed to conduct 100% inspection during production and finishing, while the remaining 48.4% asserted that it was an ineffective method, unless the quality level was not achieved. Overall, 74.2% respondent's perceived QC implementation as challenging, 16.1% thought that it was easy to manage QC and 9.6% experienced it as a difficult process.

4.1.4 Acceptance Quality Limit (AQL) and Other Sampling Techniques for Garment Inspection

Sampling was used for random checking when there was no requirement to conduct 100% inspection. In order to understand, the selection of samples for inspection, the respondents were asked about the sampling techniques used to inspect garments. Ten respondents who were mostly involved in the export market said that they conducted daily inspection based on the acceptable quality limit (AQL). Figure 4.5 presents the information of garment companies that have used AQL or other types of sampling techniques for inspection.

Figure 4.5 Sampling Procedures for Quality Inspection



With that, seven statements pertaining to AQL-based sampling were developed and the respondents were required to rate each statement based on their level of agreement on a 5-point Likert scale given. As the Cronbach's alpha for all seven

items is 0.852, no items were removed to improve the reliability of a scale. All respondents had given a positive response regarding the use of AQL based on Table 4.7. The respondents agreed that the process of inspection by using AQL was easy to understand and both buyer and manufacturer should agree the AQL limit. Apart from that, of 10 respondents, 90.0% respondents agreed that the AQL was the most effective method for sampling, and 80.0% of them agreed that the inspection results obtained from application of AQL had been accurate and reliable. AQL 2.5 was used in both in-line and final inspections. Nonetheless, out of 31 respondents, 67.7% did not use AQL and claimed that the inspection was based on their own procedures of sampling. The reasons were due to no specific requirement from the customers (52.3%), 42.9% never heard of AQL-based sampling and 4.8% claimed that 100% inspection was conducted during production and finishing.

4.2 Data Exploration

Table 4-8 and 4.9 shows the data exploration of selected variables in the survey as the results of crosstabulation analysis. This was purposefully to eyeball the pattern of the data and to see how the survey items inter-relate. The criteria of respondents were segmented into two groups as follows;

i. Market (International and local), and
ii. The accreditation to the quality systems

Table 4.7 Level of agreement on AQL-based inspection amongst respondents

No.	Statement	Strongly disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
1.	AQL-based sampling is the effective method of sampling for garment inspection.	-	-	10% (1)	20% (2)	70% (7)
2.	AQL-based sampling helps QC inspector/auditor to determine and decide at what quantities of garment parts and complete garments to be accepted or rejected.	-	-	-	20% (2)	80% (8)
3.	Inspectors were understand how to read and use the AQL table for garment inspection.	-	-	-	20% (2)	80% (8)
4.	Everyone in the quality department understand the concept of AQL	-	-	-	50% (5)	50% (5)
5.	The decision made on the quality of the entire lot is accurate by using the AQL-based sampling.	-	-	10% (1)	30% (3)	60% (6)
6.	The buyer and manufacturer (supplier) should agree on AQLs	-	-	-	30% (3)	70% (7)
7.	The quality of the garment parts and complete garments are guaranteed after went through an inspection using AQL-based sampling	-	-	20% (2)	50% (5)	30% (3)

Table 4.8 Summary of crosstabulation analysis (a)

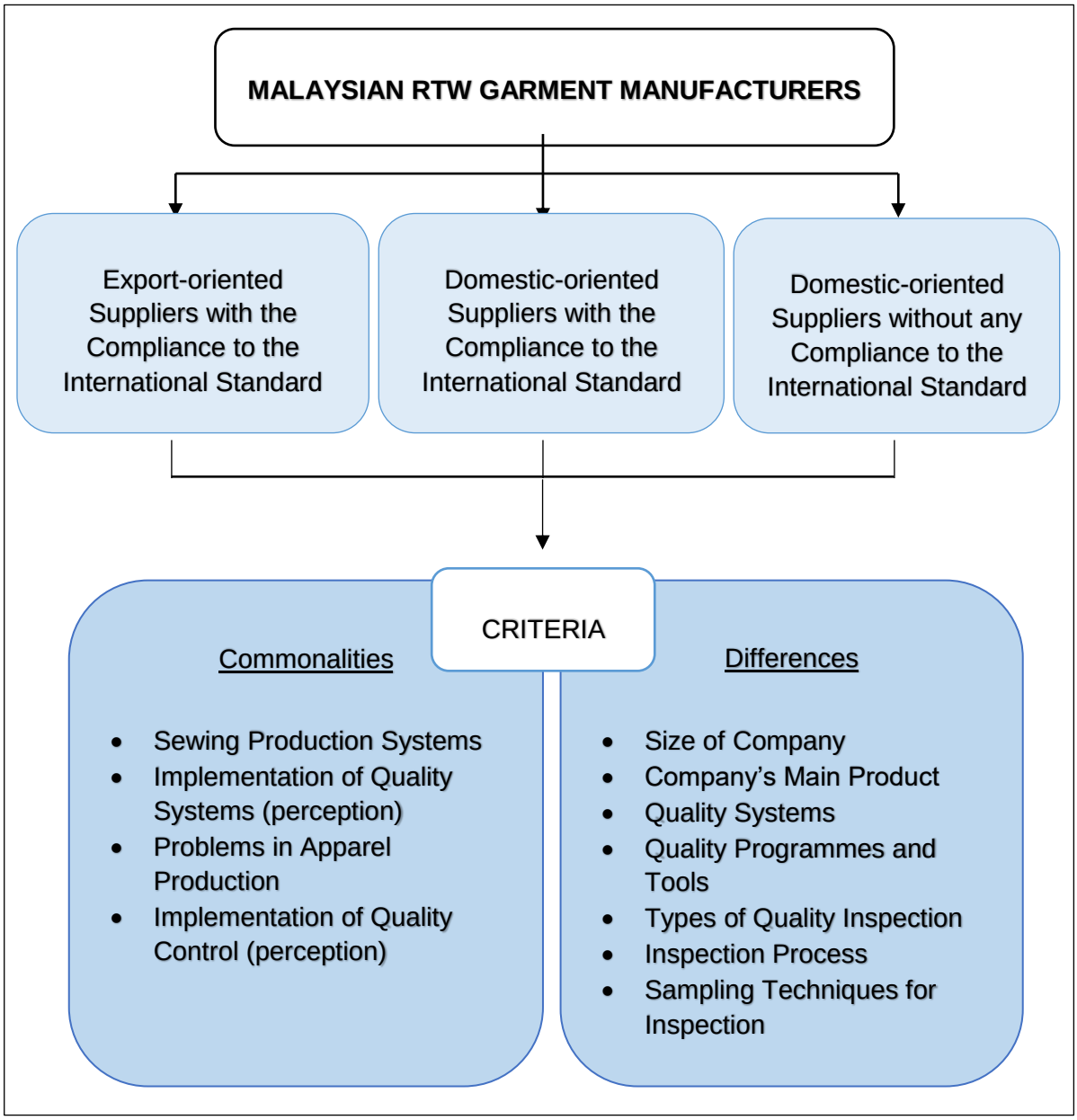
Criteria	Market		Company System Accreditation	
	International (n = 9)	**Domestic (n = 22)**	**Company with QS (n = 13)**	**Company without QS (n = 18)**
Company's size	Large companies (7)	Small-Size Enterprise (12)	Large companies (7)	Small-Size Enterprise (10)
	Medium-Size Enterprise (2)	Medium-Size Enterprise (8)	Medium-Size Enterprise (6)	Medium-Size Enterprise (4)
		Micro Enterprise (2)		Micro Enterprise (2)
Company's main product	Knitwear (3)	Work clothes & Uniform (9)	Casual clothing & Sportswear (4)	Women's Wear (7)
	Casual clothing & Sportswear (2)	Women's Wear (7)	Work clothes & Uniform (4)	
	Undergarments (2)	Casual clothing & Sportswear (4)	Undergarments (2)	Work clothes & Uniform (5)
	Men's wear (2)		Knitwear (2)	
Sewing production systems	Progressive bundle system (7)	Progressive bundle system (20)	Progressive bundle system (11)	Progressive bundle system (16)
	Modular production (1)	Full manufacturing process (20)	Modular production (1)	Full manufacturing process (16)
	Flexible Manufacturing (1)		Flexible Manufacturing (1)	
	Full manufacturing process (9)		Full manufacturing process (13)	
	Use Sub-Contractor (5)	Use Sub-Contractor (14)	Use Sub-Contractor (11)	Use Sub-Contractor (8)
Quality Systems	ISO 9001:2008 (9)	ISO 9001:2008 (6)	ISO 9001:2008 (9)	- NA -
	WRAP (7)		WRAP (7)	
	OEKO-TEX Standard 100 (3)		OEKO-TEX Standard 100 (3)	
	OSHA (1)		OSHA (1)	
Quality Programmes and Tools	Quality inspection (9)	Quality inspection (22)	Quality inspection (13)	Quality inspection (18)
	Problem solving technique (6)		Supplier evaluation (11)	
			Problem solving technique (9)	
	Training (6)		Internal Quality Audit (IQA) (9)	
			Training (9)	
	Supplier evaluation (6)		ISO 9000 (9)	
			TQM (8)	
	7 QC tools (5)		7 QC tools (7)	
			5S (7)	
	5S (5)		Customer satisfaction survey (7)	
Implementation of QS	Challenging (9)	Challenging (17)	Challenging (13)	Challenging (13)

Table 4.9 Summary of crosstabulation analysis (b)

Criteria	Market		Company System Accreditation	
	International (n = 9)	**Domestic (n = 22)**	**Company with QS (n = 13)**	**Company without QS (n = 18)**
Types of Quality Inspection	Fabric inspection (9)	Fabric inspection (19)	Fabric inspection (13)	Fabric inspection (15)
	Visual inspection during spreading (9)	Visual inspection during spreading (18)	Visual inspection during spreading (12)	Visual inspection during spreading (15)
	Cut pieces check (9)	Cut pieces check (19)	Cut pieces check (13)	Cut pieces check (15)
	In-line inspection (9)	In-line inspection (19)	In-line inspection (13)	In-line inspection (15)
	Final inspection by Internal QC (9)	Final inspection by Internal QC (22)	Final inspection by Internal QC (13)	Final inspection by Internal QC (18)
	Final audit by Buyer QC (9)		Final audit by Buyer QC (7)	
Problems in apparel production	Fabric defects (5)	Stitching and seaming defects (11)	Sewing operator fault (8)	Stitching and seaming defects (12)
	Stitching and seaming defects (7)			Sewing operator fault (11)
	Sewing operator fault (8)	Sewing operator fault (11)		Measurement out of tolerance (7)
Inspection process	The procedures and work flow of the quality inspection can be accesses easily (6)	Lack of accessibility of inspection procedures (11)	The procedures and work flow of the quality inspection can be accesses easily (10)	Lack of accessibility of inspection procedures (11)
	Records of inspection are file and kept within the retention period (7)	Lack of record of inspection (11)	Records of inspection are file and kept within the retention period (11)	Lack of record of inspection (11)
		Conduct random inspection (20)		Conduct random inspection (16)
	Conduct random inspection (9)	100% check on garments (14)	Conduct random inspection (13)	100% check on garments (14)
Implementation of QC	Challenging (8)	Challenging (15)	Challenging (10)	Challenging (13)
	Difficult (1)	Difficult (2)	Difficult (2)	Difficult (1)
Sampling Procedures	AQL 2.5	Refer to company's quality standard and procedures	AQL 2.5	Refer to company's quality standard and procedures
	Single sampling plan		Single sampling plan	
	Implementation was easy		Implementation was easy	

As shown in Table 4.8 and Table 4.9, the selected criteria were based on variables used in the survey that represented the background of respondents, sewing production systems and the QM practices. As a result, the commonalities and difference among these two groups on the quality processes can be determined. Table 4.8 and Table 4.9 display a data dredging (Kent, 2015), which helps to better understand the multiple variables in the survey and how the variables interrelated. Figure 4.6 provides an illustration that shows how garment manufacturers can be grouped based on the selective criteria from the survey. Therefore, the selection of respondents for the case study research can be determined according to three different groups as depicted in Figure 4.6.

Figure 4.6 Summary of data exploration



According to Figure 4.6, respondents who participated in this study comprised of three groups, which represents the market of their end products and the accreditation to quality management system (QMS). The information depicted from Figure 4.6 demonstrates that respondents who dealing with export and domestic market have implemented different quality management practices. The findings from Table 4.8 were simplified (see Table 4-9) which presented the comparison between three groups of companies in terms of their implementation of quality management practices.

Table 4.10 Comparison of quality management practices

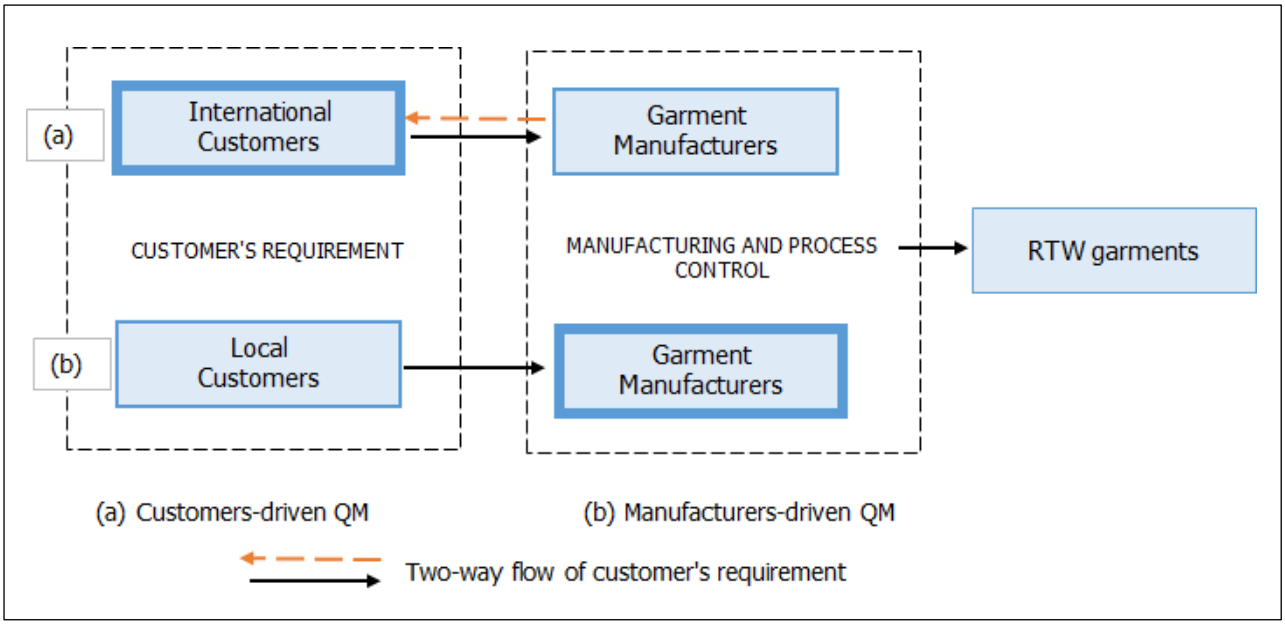
Criteria	Malaysian Garment Manufacturing Companies		
	QM adopters		Non-QM adopters
	Export-oriented Suppliers with the Compliance to the International Standard	Domestic-oriented Suppliers with the Compliance to the International Standard	Domestic-oriented Suppliers without Quality System
Quality Systems	ISO 9001:2008	ISO 9001:2008	Not Applicable
	OEKO-TEX Standard 100		
	Worldwide Responsible Accredited Production (WRAP)		
	Occupational Safety and Health Administration (OSHA)		
Quality Programmes and Tools	Inspection	Inspection	Inspection
	Training		
	Supplier/Vendor Evaluation		
	Problem Solving Techniques		
	7 QC Tools		
	R&D		
	Internal Quality Audit (IQA)		
Quality Inspection	Fabric Inspection	Fabric Inspection	In-line Sewing Inspection
	In-line Sewing Inspection	In-line Sewing Inspection	
	Final Inspection (Internal QC)	Final Inspection (Internal QC)	Final Inspection (Internal QC)
	Final Audit (Buyer QC)		
Sampling Techniques	AQL-Based Sampling	Company's own Procedures	Company's own Procedures

It is apparent from Table 4.10, companies that supplied garments to the international and domestic market adopted distinct approaches of QM practices. It was including the accreditation to quality systems, the implementation of quality programmes, the methods of quality inspection and the sampling techniques for garment inspection. The accreditation to the quality systems has become the major concern among companies that received orders from customers abroad. The main purpose of the accreditation to QMS is not only to fulfil the quality standard stipulated by international buyers, but also to remain competitive in the global market (Fatima and Ahmed, 2005). The companies that supplied to the international market adopted at least one quality system compared to companies that only that only catered to the domestic market. Interestingly, the compliance with WRAP and OEKO-TEX® Standard 100 have been preferable compared to QMS ISO 9001:2008. This indicates that the compliance with WRAP and OEKO-TEX® has been the main concern among international buyers because the industry has been extremely labour-intensive and their awareness on health and safety aspects in the

manufacturing processes. This is consistent with Crinis (2012) who reported that Malaysian garment manufacturers have built good reputation as readymade garment producers by complying with the environmental and human rights, as part of the requirement of the international buyers.

Since all of companies that involved in the export market were accredited with quality management system (QMS), they exhibited better implementation of quality programmes compared to those that were uncertified and supply to the local market. The comparison depicted in Table 4.10 also indicates that the garment companies were customer-driven in implementing the suitable quality inspection in their manufacturing process. AQL-based sampling is used for random or in-line inspection in the sewing assembly lines and the buyer QC would come to the manufacturing sites to conduct a final audit before the decision to approve or reject the lot for shipment is made. Conversely, almost all the domestic-oriented manufacturers conducted the inspection based on their own procedures and sampling technique. Despite the availability of customer's requirements, Figure 4.7 shows the different role of customers in the flow of manufacturing process. The findings from the Table 4.10 were analysed to construct Figure 4.7. It was found that the implementation of QM among the export-oriented manufactures were driven by the customers, whereas the manufacturers should demonstrate the compliance to the quality standards established by their customers with some evidence needed during the final audit. Meanwhile, for the domestic market, the customers were completely relied on the manufacturer's internal process control capabilities to control the quality of RTW garments, as they did not use any established quality standards. Thus, the initiatives of QM were dictated by the manufacturers itself to gain confidence from their customers.

Figure 4.7 Different approaches to quality between export and domestic-oriented manufactures



Therefore, as the second aim in this study is to analyse how QM has been implemented in the RTW garment manufacturing industry based on the market destination and quality systems adopted, several issues need to be addressed during the case study were formulated as the following research questions;

- How are QM practices being internalised in the Malaysian RTW garment industry as perceived by the quality practitioners to meet the market segment needs locally and abroad?
- Why managing quality in the RTW garment industry has been perceived as challenging and difficult? And What are the reasons that have hindered the implementation of Total Quality Management (TQM) in this industry? How can this situation be improved?
- What is the most suitable QM framework for RTW garment manufacturing industry? How can it be developed?

The issues highlighted as above need to be addressed while conducting a fieldwork to selected garment companies in Malaysia. Multiple case studies with one on one interview, direct observation and document review would help to answer all the research questions.

4.3 Conclusions

The general understanding of QMS and its practices in the context of Malaysian garment manufacturing were analysed in Chapter 4 (Survey Results). This was pertaining to three research questions that were crafted in Chapter 1 to achieve the first research aim. Therefore, to achieve this aim, the online survey was conducted to collate information from Malaysian garment manufacturers, with a response rate of 31%. The findings documented the QM activities utilised by the manufacturers to sustain their fashion business, notably to distinguish the quality approaches adopted by the companies with a different market destination. The analysis shows that manufacturers monitored and controlled their internal production process by using their own quality management system and selected quality approaches. A majority of respondents (71%) supplied readymade garments to the local market, and 29% of them supplied to the export market. Nonetheless, certification to the quality management system had become the major concern of companies that received orders from abroad compared to companies that only served the local customers. Hence, the implementation of quality management practices was limited to the quality systems they have adopted.

The comparison of QM practices amongst three groups RTW garment manufacturers was identified (see Figure 4.6 and Table 4.10). It was found that the garment companies were driven by its customers in implementing the suitable quality approaches in their manufacturing process. Moreover, the companies that supplied to the international market adopted at least one quality system compared to companies that only catered to the domestic market. Interestingly, compliance with WRAP and OEKOTEX® Standard 100 has been preferable compared to QMS ISO 9001:2008. This probably indicates that the compliance with WRAP and OEKO-TEX® have becoming a main concern among the manufacturers and international buyers due to the employment of foreign workers and the awareness of health and safety aspects in production. Conversely, local customers did not impose a specific quality requirement for their bulk orders and totally rely on the manufacturer's internal process control capabilities to receive the desired end products.

It was found that the companies that have been certified with quality management systems, such as ISO 9001:2008, WRAP, and OEKO-TEX® Standard 100, exhibited

better implementation of quality programmes compared to those that were uncertified. For instance, the ISO 9001 certified companies deployed problem-solving techniques, supplier evaluation, staff training, 7 QC tools, internal quality audit (IQA), as well as research and development (R&D) more frequently compared to those without ISO certification.

In addition, the important findings revealed that Malaysian garment manufacturers relied on the traditional quality control (QC) and inspection, whereas both inline and final inspections cannot be exempted in the production. This is consistent with previous studies conducted in other countries (Romano and Vinelli, 2001; Chen, 2005; Fatima and Ahmed, 2005, 2006; Norton, 2007; Rahman et al., 2009; Islam et al., 2013). Besides, the uses of advanced quality improvement tools have been very minimal. Out of 31 respondents, only three were exposed to seven new QC tools, one claimed as a six sigma company, and none of them had ever used a statistical process control (SPC). Hence, it seems reasonable to assume that Malaysian garment manufacturers did not fully operate in TQM mode, since the application of advanced concept was still limited and selective. This study confirms that garment manufacturing companies adopted a reactive approach instead of a proactive approach as highlighted by Towers and McLoughlin (2005), although many research in the mainstream proclaimed the use of advanced QM approaches to boost the industry for competitiveness (Kumar and Antony, 2009; Rahman and Masud, 2011; Hossain and Islam, 2013; More and Pawar, 2013). Operational QM, which means the act toward eliminating the defects throughout the production processes was applied substantially (Kachba et al., 2012) rather than the prevention measures.

Despite establishment of QC systems to control non-conformities products and also based on respondent's experiences, majority of garment companies inclusive of those with matured quality systems have perceived QM implementation as challenging to maintain. Theoretically, QM implementation according to TQM philosophies need full commitment from all employees in a given organisation. In the context of labour-intensive environment, involvement of employees to quality is compulsory to ensure the QMS adopted become effective. Inconsistent involvement of people would render more quality problems and slow down the process of improvement. Additionally, this study found that manufacturing activities for RTW

garments were hindered with problems associated with poor handling by the production workers. As such, influence of human factor for effective QM implementation should be researched further in the next phase of research.

It is argued that the impact of QMS and the accreditation to international standards in the RTW garment industry is relatively small after certain years of implementation as compared to other manufacturing industries. This study indicates that there are hidden issues that have hindered the implementation of total quality in the RTW garment industry, which need further investigation in the next section for a multiple case study research.

CHAPTER 5

CASE STUDY RESULTS AND ANALYSIS

5.0 Introduction

The previous chapter discussed the results obtained from the survey. However, the survey's findings are not sufficient to explain the real and complex situation of QM in the garment industry. Therefore, based on a need to further understand the survey results in depth, a qualitative approach was chosen by exploring the participant's views and observing the main production process in relation to the quality management practices in the company by conducting case study research.

This chapter focuses on describing the background and QM practices of participating companies that manufacture RTW garments. The description of each company's background includes its establishment, location, number of employees, company's main products, target markets, and category of companies, garment manufacturing process and the quality system adopted. Meanwhile, in the context of the QMS, the real practice of quality processes was elaborated based on the themes within each case, and this was followed by a cross-case analysis to determine the important themes about QM in the Malaysian garment industry that served either the local or export market.

The main aim of the case study was to investigate the results from the survey with in-depth explanations. Six companies were successfully visited within the time frame allotted for conducting this case study, between May to July 2015. The six companies were selected from a purposive sampling frame and were drawn based on three groups of companies that were determined from the data exploration process (see Figure 4.6 of Chapter 4, page 99). They agreed to participate the case study as a follow- up to the survey research based on their feedback written in the reply form that had been attached to the letter of a request to visit their company. The plan of a visit was developed based on the primary and other forms of qualitative data collection designed for the case study, including one-on-one interviews, observation and a review of document. Before the visit to the selected company, the

researcher ensured the plan of visit, interview protocol, checklist and forms created for the data collection phase were made available during the fieldwork.

In relation to the confidentiality and ethics issues, the names of the participating companies were not disclosed in this research. Instead of the company's name, the alphabetical list, *A, B, C*, *D, E, F* was used to represent each of the companies. The general overview of six Malaysian garment manufacturers is presented in the next section.

5.1 Company Overview

5.1.1 Company A

Company B was incorporated in 1984 and has more than 30 years' experience in the knitted undergarment industry. The main factory is based in Seri Kembangan, Selangor (located in west coast Peninsular Malaysia). The company started off with only 16 workers in a small factory lot, but due to rapid business growth, they are currently employing approximately 450 workers who serve in various divisional units for its business operation. This large company supplies all types of knitted and seamless undergarment for the export market.

As a contract manufacturer who received orders mainly from USA, Canada and several European countries, the major brands produced by the factory are Hanes, Hudson Bay, Everlast and Sears (Canada), Jockey, Pride USA, Jeffrey Fulvimari, Mickey, Renerofe (USA) and Damart, Movitex, Athena (Europe). The company has expanded its business by opening other branches in Bangladesh and Cambodia, while Malaysia remains as the headquarters. All orders are coordinated in Malaysia and then is directed either to Bangladesh or Cambodia based on the customer requirement in terms of quantity, types of end product (style, design, and material) and the prices agreed. The company has employed foreign workers who mainly come from Bangladesh and Nepal the production is operates using the progressive bundle system, English and Malay language are used to communicate between the production workers and the management team. It has been a common procedure for company A to conducts mandatory inspection for all orders to achieve the desired quality for exports. Moreover, the quality controller in company A will conduct a yearly visit to the branch companies and their sub-contractors to ensure the quality of

garments produced are as according to the level of quality standard required by the international buyer.

The company achieved ISO certification, MS ISO 9001:2008 in 2009. Due to customer requirements, they also have been certified with the World Responsible Accredited Production (WRAP) for social compliance. This social compliance is compulsory for most of the USA buyers, while Business Social Compliance Initiative (BSCI) is mostly used by European buyers.

5.1.2 Company B

Company B was established in 1990 and specialises in lingerie manufacturing. The plant located in Teluk Intan, Perak, which is situated in the northwest, Peninsular Malaysia. Currently, this large company employs more than 800 peoples for both management and manufacturing operation. As one of the biggest exporters of lingerie in Malaysia, their main products included brasseries, panties, camisoles, girdles, bustiers, bodysuits, nightwear and swimwear.

Company B is a contract manufacturer of customers who are mainly from the United States, Europe and Japan. Company C offers a full manufacturing process and the plant is equipped with the highly technological machineries to enhance manufacturing capabilities. The bundle system is used for sewing department. Both local and foreign workers mainly from Bangladesh, Nepal, Cambodia, Myanmar and Philippines are employed for the sewing operation and finishing process. They used either English or Malay language to communicate. As all orders are received from the overseas buyer, the inspection of garments is conducted at all levels of production, according to the inspection operating guidelines. Forms are available to record the findings. The buyers also send their own quality controllers to make a final check to the garments prior the shipment is approved.

The accreditation to QMS ISO 9001:1994 has been granted since the year of 2000, as one of their missions is to produce consistent quality and innovative products to customers. In the aspect of quality assurance, the company utilised a documentation system that complies with the latest version of QMS ISO 9001:2008, whereby the core processes have been documented. Additionally, company C is a *World Responsible Accredited Production* (WRAP) and *Business Social Compliance*

Initiative (BSCI) certified facilities. Both systems are focusing more on the social compliance in the manufacturing sites.

5.1.3 Company C

Company C was incorporated in 1995 and started the operation a year after as a contract manufacturer for the world-famous brand names such as Adidas, GAP, JC Penny, Umbro, Oarsman and Nike. However, in 1999, the company started to manufacture their own brand of school uniform and sportswear for children and teenagers, utilising their full manufacturing capacity. The plant is in Pengkalan Chepa Industrial Estates Phase II, Kelantan (located in the north-east of Peninsular Malaysia) with a total workforce of 348 people working in the company. Currently, they are the main supplier of school uniforms in Malaysia, offering a complete choice of school uniforms ranging from primary to secondary school, between the ages 7 to 18, male and female, including *baju Melayu* (traditional Malay outfit to be worn on Friday) at affordable prices. The school uniform has been a well-recognised garment among Malaysian consumers as a brand boasted the retail network of over 300 departmental stores and hypermarket nationwide.

The progressive bundle system was utilised in the production floor. On average, 180,000 pieces of school uniform can be produced monthly with operation in a single shift and 22 working days per month. The plant has been equipped with the manufacturing facilities and 100% local workforce. Meanwhile, they also diversified into manufacturing other designs and style of garments by actively becoming involved as a manufacturer for government agencies as well as the corporate sectors. In addition, the business has collaborated with the Ministry of Entrepreneur and Co-operative Development (MeCD) to implement the vendor development programme to train and support new vendors that would like to venture into the garment manufacturing industry. To date, twenty vendors nationwide have participated in the programme.

Aligning with the company's vision and mission to supply customers with a superior quality of garments and satisfaction levels, the company received MS ISO 9001:2000 certification since 2005. The certification was awarded by the Scientific and Industrial Research Institute of Malaysia or simply known as SIRIM QAS Sdn Bhd (Malaysia's leading certification body) for successfully implementing the QMS within the scope of

Manufacturer and Supply the Garment. The involvement of top management in quality can be seen when a QMS ISO 9001 was implemented throughout the processes in the company with the re-certification of this system for improving the quality products and exceed customer's expectation.

5.1.4 Company D

Company D has experienced in custom-made manufacturing of varieties of finished garments for the Malaysian market, including women's wear, school uniform, corporate uniform, T-shirt, and children's wear. Established in 2011, the factory is based in Rawang, Selangor, which situated in West Coast, Peninsular Malaysia. Realising the market demands for school uniform in Malaysia is very big and has been increased year by year, this medium-size enterprise company just ventured into manufacturing their own brand of a school uniform in 2014 for their target customers between the ages of 7 to 17, ranging from primary and secondary school.

Having 200 workers in the production line, the company managed to produce more than 4000 pieces of school uniforms monthly and manufacture different categories of products according to the orders from the local retailers. The company offered a full manufacturing process from the pattern making, cutting, sewing, pressing and packaging to customers. The bundle system is used in the sewing assembly lines with a total of 500 industrial sewing machines available in the factory. The foreign workers employed are from both India and Nepal and they used Hindi language to communicate among themselves, including with the management staff, instead of English and Malay.

One of the company's visions is to satisfy customers through the outstanding quality of the products, thus the aspect of quality has been a priority in the manufacturing process. Although the operation has just started six years ago, with the help from a dedicated staff and the support of senior management, the company has been successfully accredited with the ISO 9001:2008 QA systems in August 2014. The high-level management believes the compliance with the ISO standard would be able to help them consistently to produce a superior quality of garments and the most importantly educates all the employees about quality in manufacturing. As the company has a target to expand their business by opening their own retail outlet in the future, the accreditation to the QMS ISO (2008) is expected to help them to gain

customer's confidence of their capabilities to provide a wide range of school uniforms with the best quality in the market.

5.1.5 Company E

Company E was established in 1987 and involved custom-made manufacturing of industrial uniforms for both government and corporate sectors. The company commenced trading by tailoring orders made by the government bodies and agencies, but due to the rapid business growth, their end products now have included uniforms for all manufacturing and services industry, hospital and hotel linen, graduation gowns, and selected accessories such as hats, printed, woven and embroidered badges. The company is located in Shah Alam, Selangor, which also situated in West Coast, Peninsular Malaysia and currently has 61 employees who served in various departments from the administration and human resources to the warehouse and logistics.

Although the company is a small-sized enterprise, the production facilities available at the factory, including the embroidery machines, enabled them to offer a full manufacturing process to the customers. Producing *made-to-measure* orders for different organisations, the company has 20 skilful sewing operators, with a mix of local and foreign workers and produce the garments based on a single system. Each operator will sew one complete garment, and approximately 10 to 15 pieces of garments can be produced daily. The company also offers an alteration service to the customers who have complained about the size and fit of the clothing. In order to minimise problems related to the fit and measurement, the technical team always work together with the production and quality control teams.

Before 2015, quality checks were informal and there were no guidelines or working instructions to conduct quality inspections during production. Currently, the company is setting up the quality control department and has employed an experienced candidate for QC, to help the production team to monitor the quality of garments sewn by operators. The company also realised the importance of quality system certification to assist them in improving the way the process is done and in the aspect of documentations. Therefore, the top management has planned and looking forward to being certified with QMS ISO 9001:2008. Henceforth, each department is

required to identify their key processes to develop the standard operating procedures (SOP) based on the current practices of their workflow.

5.1.6 Company F

Company F is involved in the manufacturing of women's wear and successfully developed a well-known brand of casual wear that is modest and stylish for Muslim women in Malaysia. Established in 2011, this small-sized enterprise is located in Setapak, Kuala Lumpur before they moved into a new factory in Batu Caves, Selangor in 2015. It has approximately 25 employees, including the high-level management. The company is not only producing their own brand, but also receiving orders from other local retailers and individuals as low as 30 pieces of garments per order. The idea to venture into manufacturing their own brand of clothing in their own factory was generated when they experienced a lot of quality issues dealing with local and overseas contractors. Therefore, by having their own factory, more design and samples can be produced; the processes and products can be controlled and monitored easily rather than needing to go to the sub-contractor's place to audit their work.

Designing and manufacturing their own products and other brands in the market, was resulted from the manufacturing facilities available in the factory and also with the help from skilful foreign workers employed from Pakistan. There is no communication problem as they can use Malay language to communicate with the management staff. The production of garments, started with the pattern making, followed by cutting the fabrics, sewing, pressing and packaging were handled by the foreign workers. As company F marketed their own label of Muslim women's wear, they also have appointed authorised agents across all states in Malaysia to help promoting and selling the product to the consumers. The company from time to time would ask feedback from their authorised agents for any new samples released before the decision to produce in large quantities takes place. This is a kind of initiative made by the company to get an early feedback from the potential customers in terms of the design, styling, quality of materials, seam and stitches that would help them to improve the quality and value of the garments.

In the production, the quality monitoring is conducted by inspecting 100% of each garment before it reaches customers. The company at the moment does not have a

written procedures (SOP) or guidelines for the inspection because they tend to check all garments upon it being delivered to their outlet and also to other customers. There is no plan so far to get accredited with a quality management system due to the size of company, but it would be probably relevant soon as their business keep expanding by years.

All participating companies were diverse in terms of the criteria shown in Table 5.1, which summarise the profile of case study companies, including the years of operation, number of employees, company size, location, main product and market. All case studies are Malaysian Ownership Companies, and the factories are mostly located in the central region of Peninsular Malaysia (Company A, D, E and F). Meanwhile, Company B and C both are situated in the northern and east coast region. It has been reported by Crinis (2002), the central region is one of the locations, which houses a large number of textile and garment factories. Thus, it is no wonder that half of companies involved in this study were located in the central region of peninsular Malaysia (see Table 4.1 of Chapter 4).

In addition to the case study profiles presented in Table 5.1, Table 5.2 shows the manufacturing systems adopted by each case study companies, including the sewing production system, production strategies, production workers and compensation system.

Table 5.1 Summary of case study profiles

Companies	Criteria					
	Years of Operation	**Number of Employees**	**Company Size**	**Location (Region in Peninsular Malaysia)**	**Main Product**	**Market**
A	31	450	Large	Central	Undergarment	100% Export
B	25	800	Large	Northern	Undergarment	100% Export
C	15	348	Medium	East Coast	School Uniform	Domestic
D	4	250	Medium	Central	Women's Wear	Domestic
E	28	67	Small	Central	Corporate Uniform	Domestic
F	4	25	Small	Central	Women's Wear	Domestic

Although all companies were involved in garment manufacturing business, the process flow chart amongst them was dependent on the types of end products, and the types of process control adopted for quality monitoring.

Table 5.2 Summary of manufacturing systems

Manufacturing System	Companies					
	A	B	C	D	E	F
Full Manufacturing	✓	✓	✓	✓	✓	✓
Main Production System	Progressive Bundle System	Progressive Bundle System	Progressive Bundle System	Progressive Bundle System	Make through/Whole Garment System	Progressive Bundle System
Production Stategies	Mass Production	Mass Production	Mass Production	Mass Production	Made to Measure (MTM)	Mass Production
Production Workers	100% Foreign	100% Foreign	100% Local	100% Foreign	100% Foreign	100% Foreign
Countries of Foreign Workers	Bangladesh, Nepal, Sri Lanka, Indonesia	Bangladesh, Nepal, Cambodia, Myanmar,	Not Applicable	India & Nepal	Indonesia	Pakistan
Compensation System	i) Piece rate wage system ii) Basic wage system	Basic wage system	Piece rate wage system	Basic wage system	Piece rate wage system	Basic wage system

Figure 5.1, 5.2 and 5.3 shows a process flow chart adapted from Company B, C and F. Manufacturing process depicted in these figures showed a distinct mechanism of process control adopted by companies who produced undergarment, school uniform and women's wear. Furthermore, the process flow charts were included within this section to enable the reader to understand the main operation employed in companies who produced different category of clothing, size of company and market.

Figure 5.1 Process flow chart for garment production (Adapted from Company B)

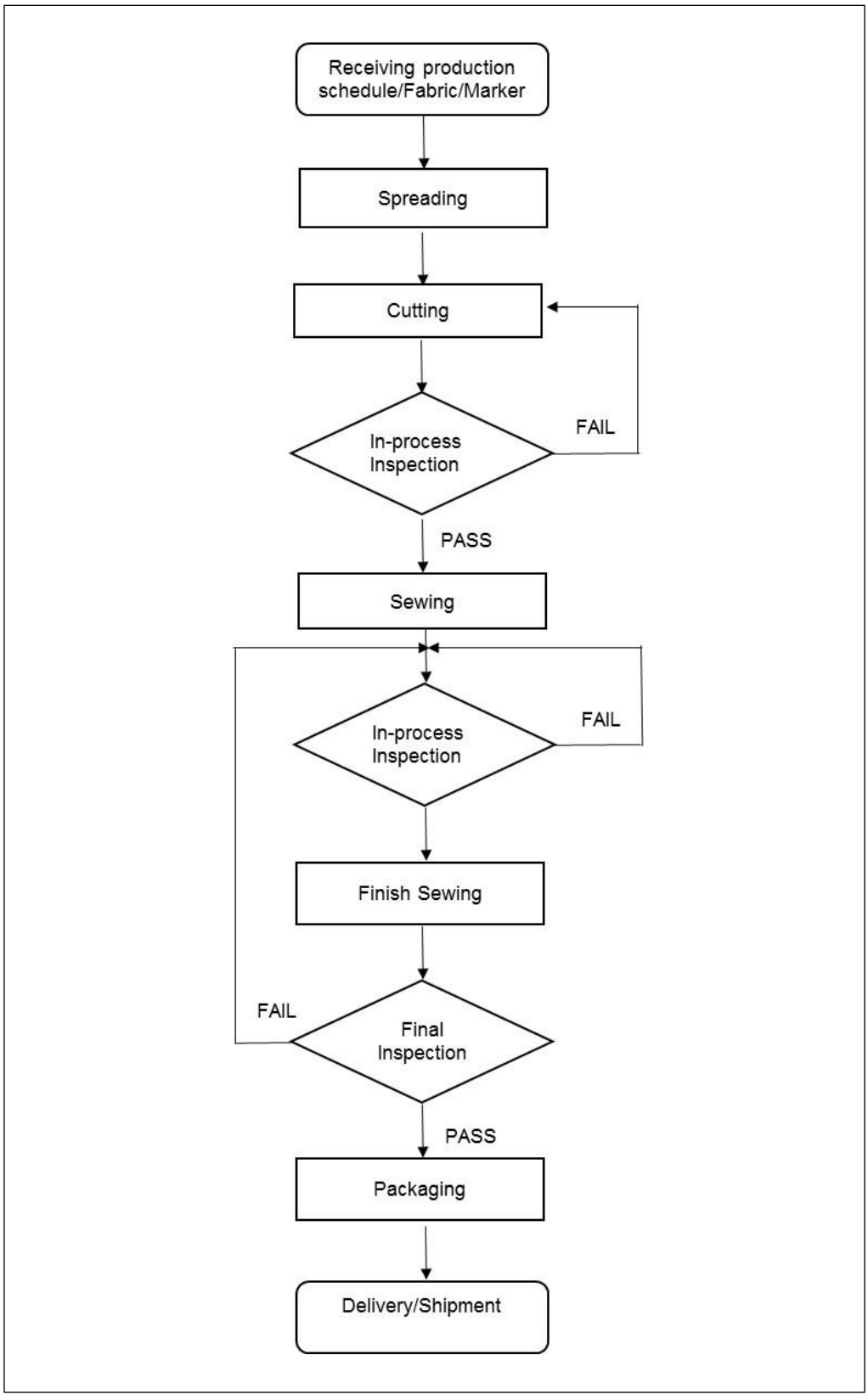


Figure 5.2 Process flow chart for garment production (Adapted from Company C)

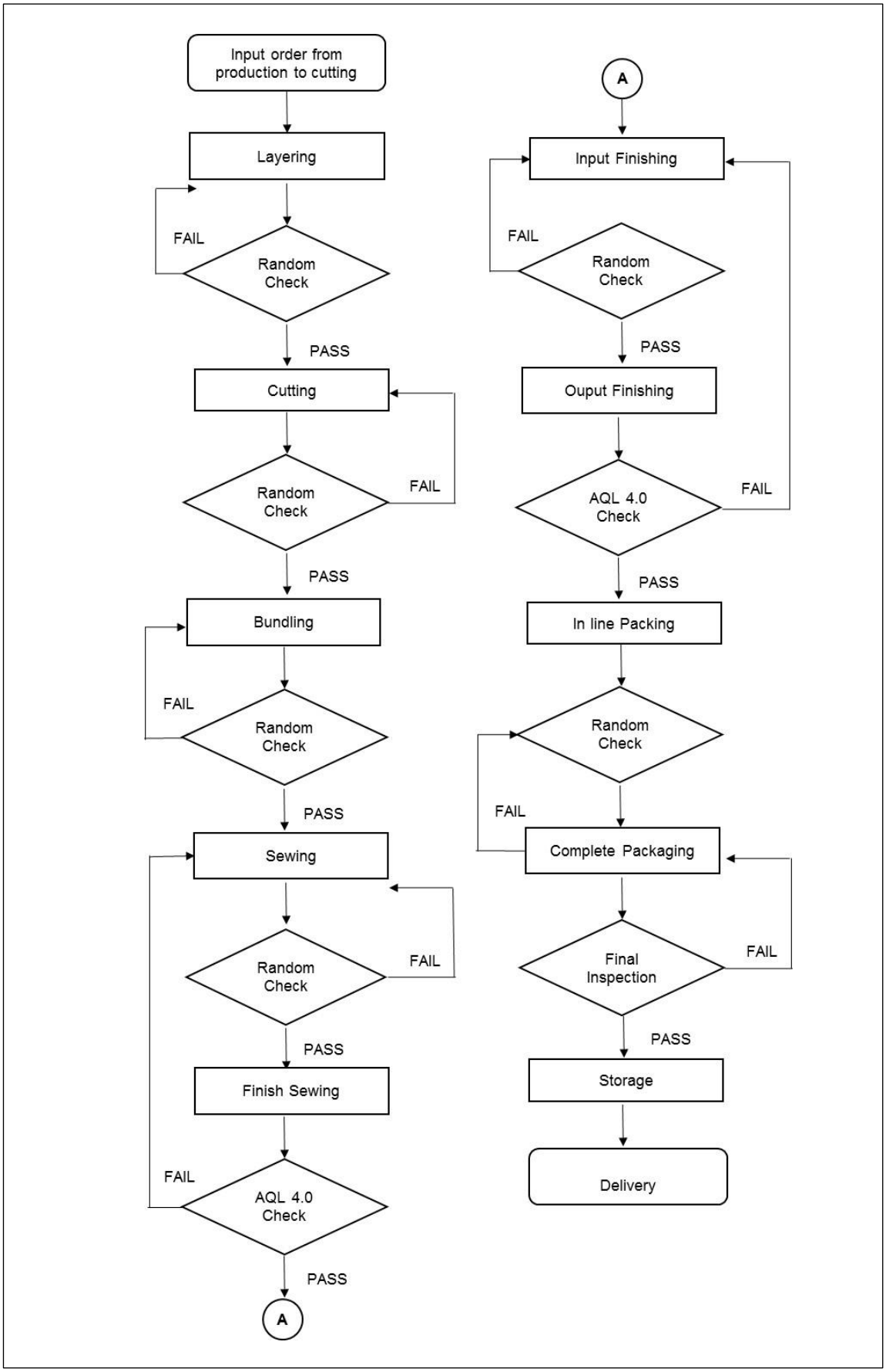
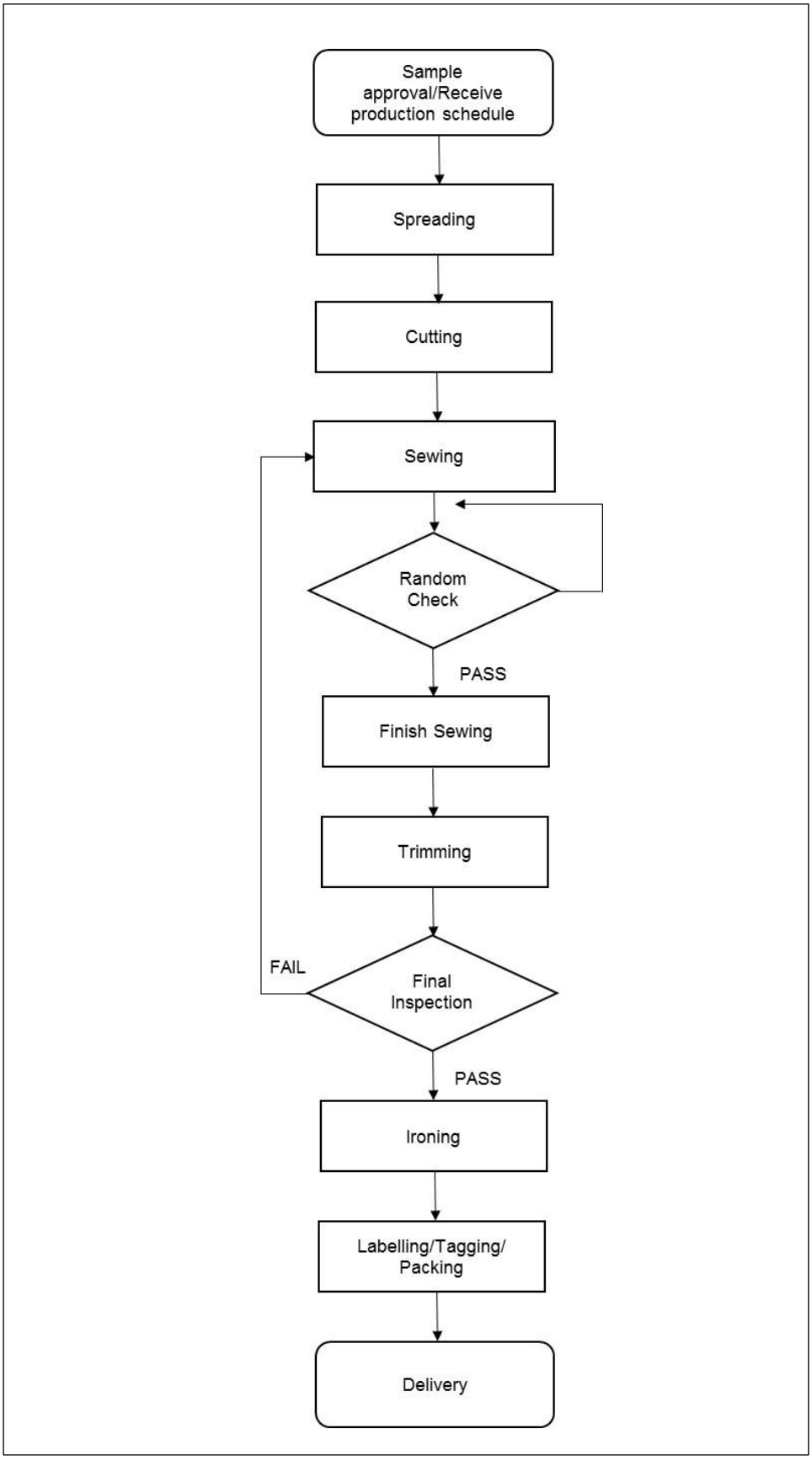


Figure 5.3 Process flow chart for garment production (Adapted from Company F)



5.2 The Interviewing Process and Presentation of Multiple-Case Studies Analysis

5.2.1 The Interviewing Process

During the semi-structured interview sessions, a list of interview questions was utilised based on the same themes developed in the survey questionnaire. The questions were related to the results obtained from the survey and were divided into four themes. The themes were quality assurance (QA), quality control (QC), sampling for garment inspection and the final theme was labelled as 'other' to indicate a mix of questions designed purposely to interview the QC inspector. The interviewees who were involved in the interview process consisted of high-level to lower-level management employees. They were the Business Owner (BO), General Manager (GM), the Human Resources Manager (HRM), the Admin Manager (AM), the Production Manager (PM), the Head of Production (HP), the Head of Quality Control (HQC), the Head of Quality Assurance (HQA), the Head of Warehouse (HW), the Sales Executive (SE) and also the QC inspector (QCI). Table 5.3 displays summary of interviews conducted in each of companies.

The way each interviewee responded to the questions would lead to other questions depending on the issues and the real situation, which occurred in their company respectively. Interviewees for case study companies were varied according to their availability during the visit, and the priority was given to the process owner who would understand the scope of research. Therefore, the number of interviews was not consistent within each company and it depended on employees who were involved in the process for the particular themes.

Each of the interview session took approximately two hours. Each interview was transcribed by hand written note by the researcher supported by audio recording to ensure the full conversation was captured. All the interview transcription was analysed using NVivo 10 software for qualitative analysis. The processes of data collection and analysis were explained in detailed in section 3.4, 3.4 and section 3.5 of Chapter 3.

Table 5.3 Summary of interviews

Companies	Number of Interviews	Themes	Informants											
			BO	GM	HRM	AM	PM	HP	HQA	HQC	HW	QCE	SE	QCI
A	3	QA				✓								
		QC								✓				
		SS								✓				
		Other												✓
B	4	QA			✓									
		QC							✓		✓			
		SS							✓					
		Other												✓
C	3	QA		✓										
		QC								✓				
		SS								✓				
		Other												✓
D	2	QA			✓									
		QC					✓							
		SS					✓							
		Other					✓							
E	4	QA			✓									
		QC						✓				✓	✓	
		SS						✓				✓		
		Other										✓		
F	2	QA	✓											
		QC	✓											
		SS	✓											
		Other	✓											✓

5.2.2 Presenting Multiple-Case Studies Analysis

As mentioned in Section 3.5.5 of Chapter 3 for case study data analysis, this research utilised multiple-case studies from the selected Malaysian RTW manufacturers to explore and gain understanding on the phenomenon researched. Results of the interviews were analysed based on the coding data represented for each theme of the QM. The main patterns of QM practices were further analysed by using both a within-case and cross-case analysis. Company overview of each participating companies was summarised using within-case analysis (see Section 5.1). Meanwhile, the cross-case analysis involved the stage of analysing similar codes from different cases. All codes from the interviews represented the important aspects of QM and highlighted issues were grouped together (Creswell, 2014).

In reporting QM issues, the researcher selected quoted passages provided by different interviewees which were related to the same codes and linked them together during analysis. This technique enabled the researcher to determine the similarities or differences of QM practices and issues among six participating companies and portray the reality of the scene (Yin, 2016). Table 5.4 shows an example how results of interviews were presented in line with the coding prior to data interpretation.

Table 5.4 Presentation of results of interview based on codes for cross-case analysis

Themes	Interview answers	Codes	Section	Page	Title of Heading
Quality Management System (QMS) and practices	Interviewee: **Head of QC Company A** *"The implementation of QMS would run smoothly if the workers follow the instruction and documented procedures. Unfortunately, they tend to neglect the procedures and continue the sewing operation to produce more quantities of garments, so that they can make more money. If they follow the instructions, either they must stop the machine, or the process of sewing would become much slower."*	Barrier to ISO implementation	5.3.1a	148	Mentality of Workers
	Interviewee: **General Manager of Company C** *"For me, garment companies must have a quality system. ISO 9000 is a guideline and without the system, it would be difficult to control the way people think and work. Everybody in the organization needs guidelines because we all think differently. We cannot expect people to think the same as us. It is all about the mentality of people. If all of the workers have a correct mentality, I don't think that we would need QMS."*	Barrier to ISO implementation	5.3.1a	147	Mentality of Workers
	Interviewee: **General Manager of Company C** *"In our company, most of the supervisors are senior in terms of service. When the QA team did the inspection, and detects any problem in the production, and then instructs the operators to stop the operation, neither the operators nor the supervisor ignored the instruction. They sometimes treated the defects found by the QA team as a small problem and continue the operation with reason to chase the shipment deadline."*	Barrier to ISO implementation	5.3.1c	150	Service of Employee

5.3 Quality Management Systems (QMS)

The ready-to-wear garment industry has been utterly customer-driven and globalised (Kim et al., 2016), hence it propelled the manufacturers to pursue the QMS accreditation and then adopted the quality system to benefit them and the customers (Brun and Moretto, 2014; Sidin and Wafa, 2014). In the case of this research, not all participating companies were certified to quality systems. Table 5.5 shows the summary of quality systems adopted by each company according to its year of establishment, company size and market. Regarding to the certification, ISO 9000

QA systems is a well-known QMS amongst participating companies, except Company E and F. Meanwhile, Company B and C were not only ISO certified, but also were WRAP compliance companies. Interestingly, the fieldwork to these companies revealed the practices of QM in both certified and uncertified companies, with some unexpected findings, which provided deeper understanding on the implementation of ISO and other social compliances in the garment industry. The following sections explain the advantages and some barriers while implementing QM in the garment manufacturing industry.

Table 5.5 Quality Management System Certification

Company	Years of Establishment	Quality Management System (QMS)			Others Certification/ Compliance	Company Size	Market	Main Export Destination
		ISO 9000	Year	Status of Certification				
A	1984	✓	2009	Stop renewal	WRAP	Large	Export	USA, Europe, Canada
B	1990	✓	2000	Stop renewal	WRAP, BSCI	Large	Export	USA, Canada, UK
C	1995	✓	2005	Ongoing	None	Medium	Domestic	Not Applicable
D	2011	✓	2014	Ongoing	None	Medium	Domestic	Not Applicable
E	1987	×	Not Applicable			Small	Domestic	Not Applicable
F	2011	×	Not Applicable			Small	Domestic	Not Applicable

Note: WRAP (Worldwide Responsible Accredited Production), BSCI (Business Social Compliance Initiative)

5.3.1 ISO 9000 Quality Assurance System in the Garment Industry

The ISO 9000 series quality standard is one of the most well-known standard adopted by garment manufacturers as it is applicable to any manufacturing and services industry (Pryor et al., 2010). In spite of targeting to achieve long-term business goal, garment companies decided to pursue the ISO standard due to pressure from customers (Sroufe & Curkovic, 2008). Customers would establish the quality requirements, so that the suppliers able to produce desired end products with better quality to them. Therefore, companies that have taken the initiative to implement a QMS generally possess better capabilities due to the strict requirements of the international standard (Gryna et al., 2007). Nevertheless, the most challenging part of ISO certification is to maintain the compliance to the standards without any pressures imposed by the senior management and as well the customers.

Furthermore, sustaining the system adopted is much difficult because the commitment needed from both the internal and external customers (Syduzzaman et al., 2013).

The questions related to ISO 9001 QA systems were asked to understand the level of adoption, the impacts and any issues raised from the system throughout the company. This multiple case study indicates each ISO certified company (Company A, B, C, D) has experienced several issues whilst complying with the standards. The following issues are mostly concerning human resources and the procedures.

a) Mentality of Workers

Although most of the interviewees agreed that, the conformance to ISO standards led to positive results, it was extremely challenging to build and sustain the quality culture in the manufacturing environment due to the mentality of workers and their resistance to change. The quality objectives were not completely understood by all levels of employees, yet the employees faced with inconsistencies in their job performance. Therefore, ISO certification is seen as a good mechanism to direct them to be more responsible for quality.

The Admin Manager of Company A (ISO certified company) shared his view about ISO 9000 compliance. He asserted:

"Although it's difficult to ensure the workers totally follow the QMS (ISO standards), we actually need the system to help us control them."

According to General Manager of Company C (ISO certified company):

"*For me, garment companies must have a quality system. ISO 9000 is a guideline and without the system, it would be difficult to control the way people think and work. Everybody in the organization needs guidelines because we all think differently. We cannot expect people to think the same as us. It is all about the mentality of people. If all of the workers have a correct mentality, I don't think that we would need QMS."*

Furthermore, he added:

"*Are we living in an environment where people most of the time follow rules and requirements with a positive mind set? Surely QMS (ISO standards), would help to increase the awareness of our workers towards quality and remind them that somebody is going to audit us."*

These statements are made based on his experiences dealing with all the employees before and after Company C adopted the QMS in 2005. Despite practising the QMS ISO 9001 for almost 10 years, he emphasised that, until now, it would still be a challenging task to maintain the system due to the mentality of workers. Some of the quality problems still exist, but the company keeps on improving both processes and products as they believed the ISO standards are an important instrument to integrate all employees to achieve the desired level of quality.

The Human Resources Manager of Company B (ISO certified company) shared her view regarding the mentality of workers towards the ISO implementation, she stating:

"There is no difference in the mentality of workers before and after the ISO 9000 certification. We have experienced that certain departments refused to follow the ISO standards and requirements, although the documentation was developed to help them to manage their job efficiently. So, you just imagine if we do not have the quality system at all, the situation would become even worse."

The issues raised by Company B and C were supported by the feedback from the Head of QC of Company A (ISO certified company):

"*The implementation of QMS would run smoothly if the workers follow the instruction and documented procedures. Unfortunately, they tend to neglect the procedures and continue the sewing operation to produce more quantities of garments, so that they can make more money. If they follow the instructions, either they must stop the machine, or the process of sewing would become much slower."*

The above interviewees explained their view on the implementation of QMS with the concern involving the workers mind set and attitudes. The Head of QC of Company B also points out that sewing operator sometimes ignored the quality of seam and stitches due to the urgency to complete the garments prior to a scheduled shipment date. Based on these feedback, it indicates that the garment industry need systems which can help them to develop a culture of quality to manage peoples employed in both administration and operation for an effective implementation of QM.

b) Problem with Foreign Workers

As the garment industry remains labour-intensive, manufacturers have used migrant workers from least developing countries to reduce production costs (Goto and Endo, 2014). In this case study, Company A, B and D employed foreign workers for garment production, except Company C. According to the interviewees, majority of

foreign workers were recruited from Bangladesh, Nepal, Sri Lanka, Pakistan, Cambodia, Myanmar and Indonesia. Crinis (2012) defines them as 'guest' workers who speak different language and not sharing the same culture as their employers. These differences led to communication breakdown between the foreign workers and the local employees.

The Human Resources Manager of Company D (ISO certified company) added that *communication barriers* are another issue in managing QMS in the garment industry. Based on her experiences developed the company's procedures and workflow of processes, she said:

"*The challenging aspects to implement QMS are when the foreign workers are not able to read the procedures or the work instructions when either it was written in English or Malay language. They even do not know how to record any data and use the computer. They are only experts in using the sewing machine, as whenever countries they travel to work, they will do the same thing, which is sewing."*

Although Company D was only recently certified with ISO 9001:2008 in 2014, the QMS cannot be implemented effectively due to the problem associated with the foreign workers. As the ISO standards cover important matters such as process control, inspection and testing, material control, product traceability, control of measuring equipment, control of nonconforming products and quality documentation (Juran & De Feo, 2010), the company should utilise and keep the established documents and records as evidence for quality improvement. Failure to record the data and to understand the standard of procedures (SOP) have been the barrier to implement the ISO standards.

In Company B and C, there were no issues with language. Most of the foreign workers are able to communicate in Malay and English and record the data as well. According to Human Resource Manager Company B, they still got the first batch of foreign workers with 10 years' experience in the company, and the new workers usually were assisted by these *senior* workers to get used to the language. One more commonality between Company A and B, the Head of Quality in both companies were from Philippines. According to Head of Quality Control of Company B, several QC buyers who visited the factory for conducting a final audit on behalf of the international buyers, were Filipino as well. Hence, the situation was indirectly

reduced the communication problem between them and helps the audit process to run smoothly.

The Human Resource Manager Company B provided her reason to employ the foreign worker to lead quality department. She said:

"It is difficult to find a good candidate for the post in QAQC to lead quality in this company and to work here for a long time. He or she should possess knowledge and expertise in this area, including quality of fabrics and stitching. It is not easy to find one"

As pointed out by the representative from Company D, the issue associated with the foreign workers was also asserted by the General Manager of Company C.

"Our *workers are 100% Bumiputera (Malay ethnic group), if we employ foreign workers, this will create another problem for the company."*

The location of Company A that is situated in the northeast of Peninsular Malaysia and within the rural community probably made it easy to get sufficient workers (local) for garment production.

c) Service of Employees

In the aspect of duration in service, the issue raised can be viewed as either positive or negative perspective. The General Manager of Company C stated that nearly 65 percent of the current employees were considered as 'seniors' and are still loyal to the company for almost 20 or more years of service. The company has used the slogan *'kualiti lahir daripada rasa kasih'* to inculcate the culture of quality amongst the employees. Company C believed that, with minimum issues associated with their internal customers and as long as the company can provide a safe working environment, they would achieve customer satisfaction.

He emphasised:

"Our current employees, who have been working with us for more than 20 years are our strength in business. Despite the slogan, the long service with us enables them to associate with the brand, be more responsible for quality and would contribute more to the company."

According to The General Manager of Company C, he believed that, the experiences gained by this group of employees help the senior management in terms of

communicating the quality requirements to the operation division and reduce the tendency of high rejection rate during production.

However, the above statement was in contrast to comments made by the Human Resources Manager of Company B. She stressed that:

"In our company, most of the supervisors are senior in terms of service. When the QA team did the inspection, and detects any problem in the production, and then instructs the operators to stop the operation, neither the operators nor the supervisor ignored the instruction. They sometimes treated the defects found by the QA team as a small problem and continue the operation with reason to chase the shipment deadline."

Then she added:

"Our QA team was having problems to communicate any quality issues they found in the sewing line with the production supervisor. As I mentioned to you earlier, the supervisor here, was very senior in terms of service, so he won't listen to any instruction given by our QA, especially to stop the production. Before this, we were lucky because the QC buyer did not find any big problem, but you just imagine if they could detect any critical or major defect during the final audit, of course they would put the blame on our QA. This is the working environment here."

Based on her statement above, it seems likely that the longer an employee's work at one job, he or she probably would become much harder to co-operate with. This is when the person is very complacent with his long service and position and felt comfortable with their own style of work, but in the meantime, resists change and being uncooperative. Therefore, when there is no teamwork in managing quality, all the efforts to build quality culture within a company will become a waste of time.

d) ISO 9001 Certification Renewal

In accordance with the requirements of the Accreditation Bodies whose provide the registration and assessment to the companies for the management systems, a renewal to ISO 9000 standards must be conducted before the expiry date of three years term of validity unless a company do not wish to renew the certificate for any reasons (Dale et al., 2007). It is compulsory for a company to decide whether the compliance to the management system standards must be carried on or cancelled prior the certification expiry date, otherwise the preparation for the surveillance audit should be planned and the QMS requirements should be fulfilled.

There were unexpected yet interesting findings with respect to the issue of ISO 9001 certification renewal. Both Company A and B had been certified with ISO 9001:2008 and was adopted the QMS more than one certification cycle. While other two companies (Company C and D) were comfortable adopting the QMS throughout their processes, Company A and B were being contrary. They realised that the renewal of the QMS was no longer necessary for their business. Therefore, after considering several important factors such as costs incurred for the renewal process and the redundancy of compliance to customer requirements (international buyer), the senior management decided not to apply for the renewal of the certification.

According to Admin Manager of Company A:

"*We thought our customers would stop auditing us by complying with ISO standards. Unfortunately, they still want to conduct the evaluation based on their audit checklist, which seems almost similar with the ISO requirements. It makes no difference at all complying to ISO to satisfy the international buyers. So, it's better if we just adopt the QMS without the re-certification process."*

The Admin Manager of Company A added that the international buyers did not accept the ISO certification as evidence of compliance to show the ability and consistency of their internal processes. The policy to stop compliance to the ISO standards also occurred in Company B. As explained by the HR Manager of Company B, the senior management had made a final decision to not proceed with the renewal process of ISO standard two years ago due to several issues around the implementation of the system within 13 years of the certification. Although she personally thought that the company should continually adopting the QMS, she stating:

"*This is our senior management's decision to stop the renewal of QMS and cancel the re-certification. I would say that ISO is important for us too, but if this is what the senior management want for the company, we have no objection"*

Besides the high cost incurred of renewing the system and compliance audit that should be conducted annually, the requirements from overseas buyers who compulsory to be fulfilled are the other reasons Company B chose to stop the re-certification. Each of their customers have their own quality requirements which covering the whole aspect of managing and controlling the inputs, processes and output in a company as similar as the ISO standards. However, the ISO certification

was meaningless, unless the customers would accept the compliance to the ISO standard amongst their supplier. Therefore, a decision to skip the ISO 9001 certification renewal was not purposely to undervalue the standards, the senior management of both companies realised that the customer requirements are much more important to be fulfilled and prioritised. Although the QMS ISO standards have been internationally recognised, it seems reasonable to assume that its applicability in the garment industry is limited, notably for manufacturers who liaised with the international market.

e) Documentation System

The ISO standards are extremely helpful in aspects relating to documentation and records, thereby providing the clear guidelines on documentation the system, including controlling the documents and records. Adopting the ISO standards requires the organisation to document the actual manufacturing processes to meet the customer requirements, strategise plan to meet them, check the implementation and take appropriate actions to improve it (Sıtkı İlkay and Aslan, 2012). According to Majumdar and Manohar (2016), a documented QA system among the ISO certified companies, has made the employees to be more organised and responsible for the quality system. Hence, this would greatly benefit any SMEs to manage their company's documentation.

All ISO certified companies (Company A, B, C and D) agreed that the management of documents and records were more organised, the standard operation procedures (SOP) were better documented, and the filing systems were improved.

According to General Manager of Company C:

"*One of the advantages of adopting ISO standards is the availability of documented procedures, which we can always refer to. Documented procedures are very important as a reference before we start doing any job. So, everybody can refer to the procedures."*

The HR Manager of Company D made the following comment:

"*Although we have just been certified with the system in 2014, the company is very proud to use the QMS ISO 9001:2008. We were starting to know the Standard Operating Procedures (SOP), the flow process and how each of the machines should have a documented work flow how to use it."*

Company A has shown good practice in the implementation of documented QMS, even though the ISO certification was no longer required for their business. According to the HR Manager, the company developed its own mechanism to implement and control the documents. A server and back-up server were used to collate the company's database, thereby all staff who have a computer can access the required documents. Moreover, the system allowed them to download the ISO documents for departmental use and shared files as well. By using a company server, all staff can open, view, read and use specific documents in a soft copy format. This kind of approach will definitely help everyone in the company to control the use of documents.

Realising the documentation system has been used for more than 10 years, the senior management of Company B decided to maintain the QMS documentation even without the compliance to the ISO standards. Nonetheless, some of the employees were reluctant to follow the standards due to too much paperwork and documents to deal with.

According to the HR Manager of Company B:

"In a certain situation, the employees avoided using some forms or other quality records to speed-up their job. It is quite complicated to use and control documents or records in this manufacturing environment, where everybody works very fast and not willing to wait. Most of the time, they rely on HR department regarding the use of QMS documentation."

The above findings indicate that, although the documentation systems have been established in all case study companies, the use of documents and records could possibly become less effective due to the employee's attitude towards the requirements of QMS documentation. Furthermore, the ISO 9001 QA system should not be perceived as a tool to standardise and document the practice, without practising it. Poksinska et al. (2006) mention that the mistakes made by some ISO certified companies when much focus given on the documentation of both working instructions and the procedures rather than the activities documented. According to the authors, paying attention only to establish the documentations without practising it does not provide any value to the organisation. Thus, implementing the ISO requirements according to the documented procedures, at the same time using the

right quality records as evidence are a good example of complying to the ISO standards.

5.3.2 Other International Compliance

Most of the time, the desire to be certified with QMS is largely dependent on the senior managers decision (Chowdhury, 2007; Hakoma, 2007) and it is the customers who predisposes their suppliers to compliance to specific quality standards (Brun & Moretto, 2014). This study has provided the same findings as was stated in section 4.1.2 of Chapter 4, that 'customer requirements' and 'improving the management process' are the utmost reason for companies to proceed with QMS certification. Due to this reason, Companies A and B have stepped forward to certify with World Responsible Apparel Production (WRAP) and Business Social Compliance Initiative (BSCI), as they are being a contract manufacturer for the international buyers. The compliance to regulatory standards must be fulfilled to remain competitive in the global market and being preferred as a supplier for well-known overseas brands.

The Admin Manager of Company A explained the reason of the WRAP compliance, he stated:

"*Most of the US buyers such as Hanes and Sears can accept WRAP certification. Therefore, no further audit required for WRAP certified facilities and we can run their order straightaway. That was a reason we became a WRAP certified company. We want to follow the customer requirements."*

Having more than 10 years experience's dealing with the international compliance in Company A, he shared the information related to WRAP certification. According to him:

"*WRAP is for social compliance. Our production facilities have been granted with WRAP certification because we achieved fully compliance on the employee benefit, insurance, salary, annual leave, medical leave and others aspect. It is social, you have to remember that it is under social category which includes employee, environment, safety and health and a little bit on custom threat compliance."*

He also stressed that the European buyers and US have required different types of audit based on the brand of the clothing. It includes the audit conducted to check supply chain security (against terrorism), brand protection and track compliance.

The view of this situation also was shared by the HR Manager of Company B. She said:

"*WRAP certification is not the only one we have to comply with, we also must fulfil others international buyer such as Kohl's and JC Penny's requirements. If I'm not mistaken, besides WRAP, we need to comply with BSCI as well. Each buyer has their own level of quality standards and their requirements are more advanced compared to QMS ISO"*

This indicates that contract manufacturers would adopt the system based on their customer requirement, and not merely relying on the ISO 9000 QA systems to be competitive in the global market. This finding confirms the study reported by Thaver and Wilcock (2006) that ISO registration was not considered as an important criterion by Canadian apparel buyers for their overseas vendor evaluations even though the ISO standards are a well-known QA system in leading to certain benefits. Nevertheless, in relation to the adoption to ISO 9000 QA systems, it can be observed that both RTW manufacturer and the customers are not using a common set of standard that able to build ties in the supply chain. According to Teng and Jaramillo (2005), it is important for supply chain members to establish and use similar quality standards to achieve the quality goals.

Based on the QMS adopted by all participating companies, Table 5.6 summarise the variant outcomes of three different categories of manufacturers as defined in Figure 4.6 (124) based on their commonalities in QMS and also the company's background. Based on the feedback from each interviewee, the key findings of QMS implementation were determined. The key findings listed for each category revealed the importance of the QM according to the size of the companies and the market's destination they supplied the end products to. Despite the commitment and concerted efforts of these manufacturers to comply with the standards, the implementation of ISO 9000 QA system led to different outcomes based on all categories of companies. The QM difference across the three groups are analysed as follows:

Table 5.6 Key findings of case study companies in the adoption of QMS

Case Study Companies		Background	QMS and other international compliance adopted	Key Findings
A and B	Export-oriented Suppliers with the Compliance to the International Standard	• Large companies • Export market	• ISO 9001:2008 • WRAP • BSCI	• The QMS 9001: 2008 was not successful to be implemented because the priority given to fulfill the international customer requirements. • Redundacy of compliance to ISO standards and the international buyer's requirements. • The QMS ISO 9001 was perceived as a documentation system. • Social compliances were much preferred by the international buyers compared to the QMS. • The major challenge to maintain the QM in the garment industry was associated with the 'human' issues.
C and D	Domestic-oriented Suppliers with the Compliance to the International Standard	• Medium-size companies • Domestic market	• ISO 9001:2008	• The QMS 9001:2008 has been a useful quality system because in the persepective of senior management, it was seen as an approach for improvement and provided guidelines to integrate all employees in the company towards company's quality objectives. • The QMS ISO 9001 was perceived as a documentation system. • Both companies were committed to complying with the ISO standards, irrespective the years of operation, and their experiences were exemplary, typically for others manufacturing companies. • The major challenge to maintain the QM in the garment industry was associated with 'human' issues.
E and F	Domestic-oriented Suppliers without Quality System	• Small-size companies • Domestic market	No QMS	• The awareness and any decision towards meeting a company's goal depended on the senior management intiatives. • Quality agenda was initiallly attempted and carried out by the experienced employees. • The senior management relied on the expertise of experienced employees for garment production and Quality Control (QC). • It was obvious that small companies were not comfortable with the formality of ISO 9001 standards and requirements, thus the certification to the QMS was not strategically planned to be achieved in the few years to come. • The major challenge to maintain the QM in the garment industry was associated with the 'human' issues.

a) Export-oriented Suppliers with the Compliance to the International Standard (Company A and B)

Manufacturers that supplied RTW garments abroad agreed that ISO 9001 QA system was useful for them to establish the company's management system, most importantly in documentations for both the internal and external use along the value chain. Nevertheless, the compliance to the ISO 9001 requirements was deemed less effective to increase the customer's confidence (international buyers) towards the company's manufacturing processes.

According to the senior management of both companies A and B, instead of auditing and reviewing the existing documents and records of ISO 9001, the buyers have requested them to use the separate documents and conduct a different audit based on their quality standards, even though most of the requirements were found similar to the ISO 9001. Considering this issue was involving the customer-supplier relationship, the underlying causes were implicitly analysed based the perception of Malaysian contract manufacturers and the overseas buyer.

From the perspective of Malaysian RTW contract manufacturers, this situation brought up the dilemma of which requirements should be prioritised as a common set of standards, because both of the compliances were integral for the company to remain competitive in business. It was believed that as the ISO certification was deemed as a marketing strategy to attract new customers, maintain existing customers, and increase their trustworthiness towards the manufacturer's capabilities to create value for their products. Nevertheless, they had experienced the unexpected situations while still conforming to the ISO requirements. Apparently, the redundancy of works and quality activities as conformance to both standards had effectuated manufacturers to only focus on fulfilling the international buyer's requirements instead of the ISO 9001. In addition, the requirements such as training needs for the internal employees and the annual surveillance audit, impelled the manufacturers to plan ahead the budget allocation for any suitable training needed to ensure employees competencies. Besides, to ensure continued conformance to ISO 9001 requirements, surveillance audit should be planned, and it also incurs a high cost. An allocation of budget to maintain the system was not financially worthwhile,

whereas the international buyers were reluctant to accept the conformance to the QMS ISO 9001.

Consequently, this situation predisposed Company A and B to develop a misconception towards the adoption of the ISO standards. The senior management was no longer taking the ISO compliance as one of the company's quality goal, in fact they refused to request the re-certification audit, which usually takes place at the conclusion of the third surveillance year. The decision reflected that the renewal of the QMS ISO 9001 was not necessary for their business based on the quality requirements imposed by the international buyer.

In spite of this, they still continue to utilise the existing standard operating procedures (SOPs) as according to the established company's documentations and quality records. It was found that the document systems were well-organised and can easily retrieve. This is the utmost advantage of ISO certification from the senior management point of view. However, it was found that they were not completely practising the standards because the compliance to the documentation requirements was seen as additional work tasks that led to increased workload. A minimum use of documented procedures in the ISO certified companies would surely leave a question mark on the effectiveness of planning, operation and control of its processes.

Thus, in the case of this research, problems associated with the job redundancies and a cost incurred to maintain the QMS, are the main factors that impeded the implementation of ISO 9000 quality management system among Malaysian RTW contract manufacturers. This implies the compliance to the ISO 9000 standards are not prerequisite requirements among the international buyers to their appointed suppliers or contract manufacturers. This study also shows that the implementation of ISO 9000 quality management system in the Malaysian RTW garment industry, particularly for contract manufacturer would be difficult to maintain as long as the QA paperwork and documents are still depending on the individual buyers own standards and requirements. Hence, in the case of Company A and B, the ISO standards was seen as unsuccessful attempts to gain the customer satisfaction.

Nevertheless, in the respect of international buyers, they have been developed thorough quality requirements to protect their own brand during manufacturing at the supplier's location all around the world. Although the manufacturers are responsible for ensuring the quality requirements can be met with the availability of production facilities and human resources, most of the time the buyers will dictate the level of quality according to their own quality standards (Yu and Lindsay, 2011). This includes the compliance towards the site conditions, social compliance, the Customs-Trade Partnership against Terrorism (C-TPAT) and the workmanship audit (Vendor Factory Evaluation supplied by Company A). Thus, the buyers will provide manufacturers with the QA manual, standards, manufacturing specifications and also the criteria for the factory evaluation. Furthermore, the "independent agent" was appointed, as the company's representative to conduct the final inspection prior approval of the shipment to the customers. All these approaches were a mechanism used by the international buyers to assist and guide the manufacturers to control the quality of their RTW brand in the processes of manufacturing.

As explained by Company's A Admin Manager (section 5.3.1 (d) of Chapter 5, page 153) who was also a resource person for QMS ISO 9001 in the company, international buyer's and the ISO requirements have similarities in relation to:

i. Quality Management System (including documentation requirements)
ii. Management responsibility
iii. Resources management
iv. Product realisation
v. Measurement, analysis and improvement

However, it was found that the ISO 9000 certification in both Company A and B could not be used as an exemption for a scheduled external audit conducted by the international buyers. It shows that the quality requirements imposed by the buyers could not be merged with the ISO standards. It should be noted that the ISO 9001 quality management systems has been well-known international quality standards which provided a framework for manufacturing companies that are strongly committed to constantly improving the organisation (Poksinska et al., 2006; Sampaio et al., 2012). As such, the buyer should become aware the commonalities between their quality requirements and the QMS ISO 9001 standards. Considering the

commonalities, the buyers should accept the compliance to the ISO 9001 standards as an achievement of their suppliers towards creating and sustaining the quality culture in the organisation. The compliance to ISO 9001 standards must be seen as quality initiatives done by suppliers to strengthen the company's QA system, as well as cultivating a quality awareness among their employees so that the company's target can be achieved smoothly. Hence, the ISO-certified supplier or manufacturer will not feel pressure and continually stay in dilemma to ensure the customer requirements can be fulfilled. This research suggests that there are misconceptions between the RTW garment manufacturers and the international buyers towards the adoption of ISO 9001 standards to the point that it was perceived as ineffective QMS to be adopted for the export-oriented Malaysian RTW garment companies.

b) Domestic-oriented Suppliers with the Compliance to the International Standard (Company C and D)

This study shows that Malaysian companies that supplying RTW garments to the local market, received (orders from an individual customer or small retailers that did not own production facilities for mass production. In the case of Company C and D, they were not only produced RTW garment for their customers, but also producing their own label of school uniform to cater both primary and secondary school. Unlike companies in category one who viewed ISO 9000 quality management systems as no longer effective for their companies, Company C and D would continually maintain the systems for the benefit of the internal and external employees. It was found that they pursued the ISO 9000 certification as part of their strategic planning and most importantly to coordinate all employees and navigate them to achieve the company's quality objectives.

This study shows the RTW garment manufacturers among the medium-sized companies, which supply to the local market believed that the ISO certificates extremely help them to stay focus in quality, manage the peoples and manufacturing processes and also establish the document systems for the company, even without any quality requirements from the local customers. It indicates that Malaysian RTW garment manufacturer realised the importance of adopting the ISO 9000 quality management systems, as aligned with other manufacturing industry. Nevertheless,

as experienced by the senior management, there were several setbacks in maintaining the quality system as according to the ISO 9001 requirements.

5.3.3 Quality Programmes in ISO Certified Companies

Aligning with the QM principles which require an involvement of people and continual improvement, many quality programmes are conducted to empower the human resources, to sustain the organisational performance and as well to exceed customer satisfaction (Eriksson, 2016). Although Company A, B, C, and D have been complying with the international standards, the use of quality programmes was very minimal. According to the survey results presented in section 4.1.2 of Chapter 4 on quality improvement programmes and tools, an inspection process was chosen as the most widely used quality management activities in respondent's companies. However, the application of advanced concept was still limited and selective.

The interviewees were asked the reasons manufacturers to have considered quality inspection as a dominant quality management approach in the garment industry, yet they did not utilise any advanced quality programmes. This case study indicates that the issues associated with the production workers, and the sequential processes involved in making garments were the main reasons they still relied on quality control/inspection to minimise quality problem. Considering that the industry has been recognised as labour intensive, the issues that were associated with human could not be avoidable.

According to the HR Manager of Company D:

"In today's competitive business environment, we really emphasise on quality and price. Therefore, we would ensure our product's quality are guaranteed by conducting series of inspection from the stage of receiving of materials until the product is ready to be delivered to the customers, with no exception."

She added:

"The most important resource in the garment industry is a sewing operator. They are not a machine, but human. In comparison to other industries such as electrical and electronic, their operations are machine-based, so that's why they can easily implement six sigma and other advanced quality improvement programmes. When we deal with mass-produced garments, is the machine does the sewing process? No. It is human. So, sewing operators will do few things, he will sew and inspect the

garments. That's why our industry is unique. Most of the production activities are handled by human, including spreading and cutting."

The General Manager of Company C claim that:

"Inspection is to give assurance to customer your product is good. For me is very simple, quality of garments can be properly controlled if one operator sews the garments from starts until complete. The problem is, the sewing process involving many operators in the assembly lines and there is a possibility of making mistake."

Both interviewees brought up the issue of 'human factor' that has made the quality inspection must be carried out along the production process. Although they knew that too much focus on the inspection might increase the cost of quality, the process has been carried on because to achieve customer satisfaction. For companies who supplied abroad (Company A and B), the inspection is compulsory prior shipment is approved. Therefore, the internal QA or QC would conduct a thorough inspection before the final audit take place.

The Head of QC of Company A shared her opinion about the importance of inspection in garment manufacturing industry. The main reason is because the process flow in making garment involving many processes and the way garments transported to one section to another section, exposed the fabric with stain or dirt mark.

She asserted:

"All bundles were put inside the trolley and sometimes in the poly bag and they will send it to other departments for next operation. After an operator open one bundle, few pieces of garments were put down on the floor. How could you be sure the garments are free from stain? What should the operators do? Sew or re-work? of course, they want to concentrate with sewing"

Her statement indicates that there are situations where the quality issues are difficult to control, particularly when the operators tend to work rapidly rather than to work accurately. According to the interviewees, other quality programmes and tools utilised in their company were training, internal audit, supplier evaluation, staff evaluation and problem-solving techniques. Nevertheless, those activities were not consistently carried out amongst them even though they were ISO certified companies.

In relation to the above-mentioned challenges, quality control functions are viewed as a dominant approach in adopting QM in RTW garment manufacturing. This situation even occurred with the presence of the international quality standards accreditation. Process control was embedded throughout the manufacturing process whereby a visual inspection commenced once the materials were received before being stored in the warehouse. Internal inspection procedures were documented and practised, in fact the international buyers have their own inspection standards to be fulfilled by the manufacturers based on an agreed Acceptance Quality Limit (AQL). Additionally, some of the companies were comfortable conducting 100 percent final inspection just to assure no product returns and other complaints received from the customers. Hence, it indicates that garment manufacturing industry heavily employed the control system approach for their company's QM.

5.3.4 Quality practices in Non-ISO Certified Company

Theoretically, manufacturing companies without an established QMS and other international compliance are organised quite differently compared to ISO-certified companies. While ISO-certified Company is directed towards achieving the requirements of the QMS standards and more focus to strategic management systems (Pryor et al, 2010), non-ISO certified company was in the opposite. One of the main factors, they have been served by small suppliers (Goto and Endo, 2014), which are less likely to utilise strategic planning than medium or large companies.

Company E and F were small companies and supplied ready-to-wear garments to local market, as yet they were not ISO-certified. Furthermore, years of operation of both companies were distinct. Company E, for instance, although they have been served the local market for more than 25 years, they did not pursue for any quality system. It seems likely that the ultimate decision to adopt with a QMS has been dictated by the senior management based on their experiences dealing with the suppliers and customers along the supply chain. The following statement was given by the HR Manager of Company E on the main factors which delayed them to get certified with the ISO 9001 standards.

According to him:

"*We are not against the ISO certification, and yet we are not too complacent with the current system adopted by the company. It is just a matter of time. Accreditation to the ISO standards requires us to handle with much paperwork, and other documentation as well, which I think the most challenging task to carry out before proceeding with the certification. Sometimes all of staff here are too busy with their main job scope, thus we found it hard to establish documents needed to comply with ISO standards."*

However, realising the importance of QMS certification to be more competitive in business, Company E believed that this would be one of company's strategic plans to be considered in the future. Then, he stating:

"*We have been thinking to be accredited with ISO certification. As a preparation to adopt with the system, we still in progress of to develop the Standard Operating Procedures (SOP) from each department. I had brought up this matter during the management meeting, whereas all departments are requested to identify and document their processes by creating their own SOP. All the SOP's will be compiled afterwards to establish the company's working procedures. This is to standardise their routine job, and the SOP's can be revised from time to time. Absolutely, this would help everybody's work to run smoothly."*

In the contrary, Company F did not plan to be certified with the ISO standards due to their new involvement in apparel manufacturing business (four years) and their focus was currently on day-to-day operation with the availability of resources they have. According to the Business Owner of Company F, managing a small company that employed approximately 25 employees were not an easy task. However, with the help of skilful foreign employees for the main production, the internal processes can be controlled and managed effectively. Any quality issues would be a learning phase for them to understand ins and outs of the manufacturing industry, as they could identify the potential failure that may arise associated with the garment production.

The following information were the feedback raised up by the interviewees from both Company E and F towards the management of quality in non-ISO certified companies.

a) Quality Programmes

Unlike ISO-certified Company, there were no specific quality improvement activities had been conducted in both Company E and F. They were relied heavily with the

inspection process to ensure the final products are free from defects. Both interviewees from Company E and F mentioned several reasons that made the inspection as a dominant quality process in their company. For Company E, they have experienced with many cases associated with the body measurement, which brought up problems to the wearer on clothing comfort and fit. Considering the quality issues could not be controlled all the times, QC department has just been established in 2014. The purpose was to monitor and check regularly the quality of fabrics from the cutting process, which is the most important stage for made-to-measure (MTM) before the bundles of cut pieces were sent to the sewing section. Since each part of garments were cut according to body measurement of their individual customers, any defects found would become a major problem in production.

The HR Manager of Company E provided the following point of view:

"*Before this, we totally depended on the production itself to control the quality. However, just recently we decided to employ an experienced candidate to conduct quality checking in the production. In my opinion, inspection is extremely an important process in the garment industry. Customers only want good and usable products. If we are able to satisfy and exceed their expectation, definitely, they would become loyal with us."*

He stated that, the company carried out a quality inspection regularly for each order that mostly received from the government agencies. Furthermore, being as one of the suppliers of corporate uniform for the government servants, quality of finished products has been of paramount importance due to the competition from other local suppliers. Therefore, they have aimed to reduce the customer complaints resulted from proper quality checking from the stage of cutting until packaging of the final products.

Meanwhile, the Business Owner of Company F emphasized three main factors, which caused the inspection to be predominant quality activities in the garment industry. She made the following comments:

"*In this industry, we have dealt with variability of resources required for the manufacturing. First, we were utilised varieties of fabrics, accessories, design and sizing. Second, we also relied upon the skill of man power for sewing operation, who was not consistent with each other and may lead to a possibility of poor handling. Finally, we have different customers as well, who possess their own specification*

associated with materials, style and design of each clothing line. Hence, all of these factors were reasons that made an inspection such a useful process for garment manufacturing."

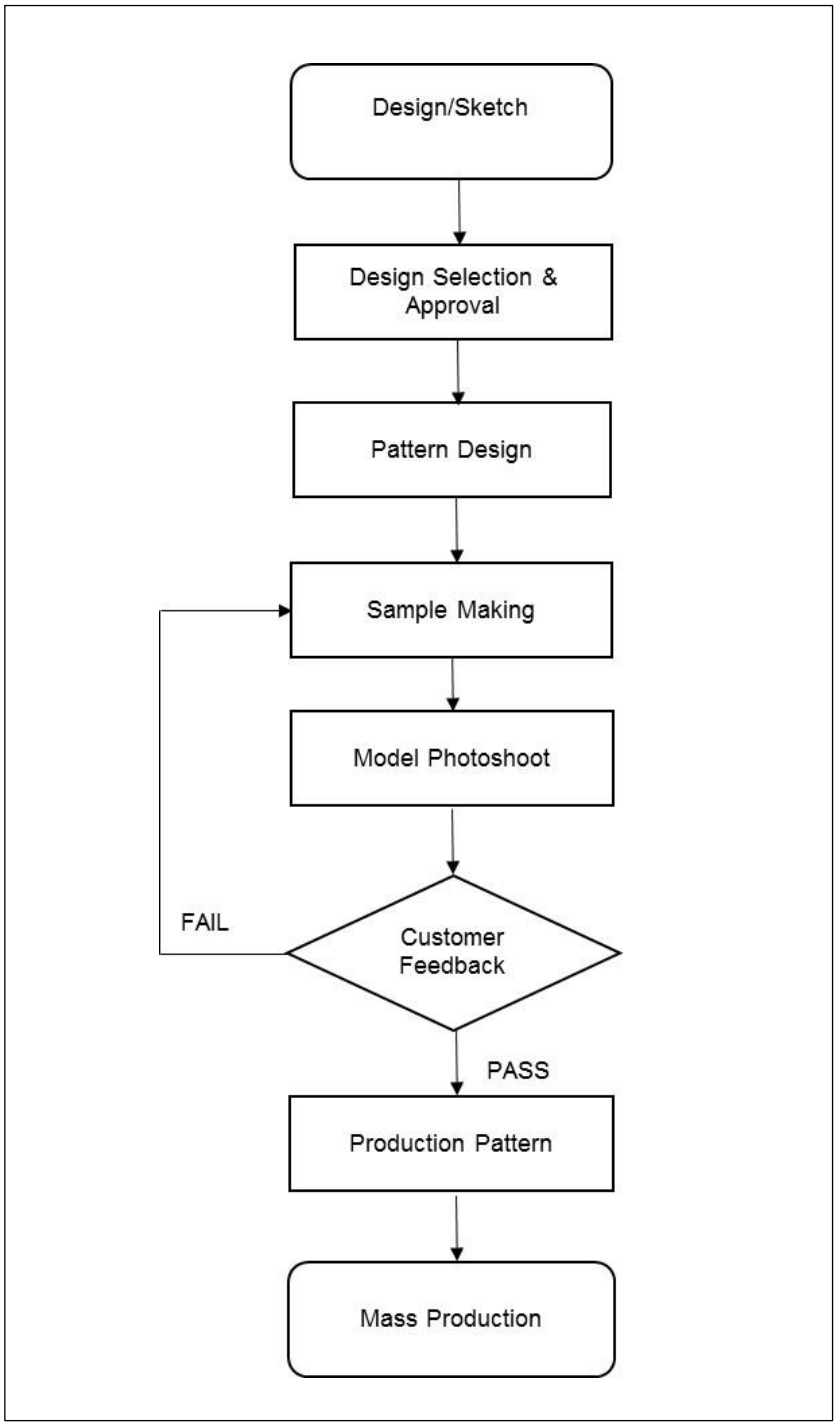
For both companies, there were other activities planned for quality improvement. The conversation with interviewees revealed that they had planned and carried out several quality programmes, even without the adoption of quality system. The activities such as training, supplier evaluation, problem-solving techniques, an internship programme, management meeting and customer satisfaction feedback were informally conducted. It was considered informal because there was no established guidelines and procedures for dealing with those quality activities. Even so, each company had given a good example of management practices in a specific area of their operation.

Moving towards learning organisation, Company E has provided opportunities to students from Higher Education Institution (HEI's) to undergo 3-months internship programmes in their company. The selected students will be exposed with the garment manufacturing process, including techniques for body measurement and involved in administrative work as well. Additionally, they also have planned to collaborate with the National Youth Skills Institute of Malaysia for ongoing in-house training in their company. This training will benefit Company E employees in terms of their self-improvement and other related knowledge and skills as each of them will be awarded with the certificate for their participation and competencies. However, the programme was still pending due to the approval from the National Youth Skills Institute.

On the other hand, Company F demonstrated an innovative way for sustaining the quality of their own brand and any order from the customers. Company F will ensure the selection of design, colour, fabrics and accessories would satisfy the customers before the actual production take places. Any design selected for sample making will be produced to one particular size and usually a size that would fit a model who is going to wear the finished garment during a photo shoot. The photo shoot session for new samples was arranged for each customer, so that they could view the samples displayed by a model and provide any feedback for improvement. The final decision is made, whether it needs additional changes or can be approved for mass-production. Figure 5.4 shows a flow process of sample making in Company F.

Since Company F has produced their own brand of women's wear as well, they had planned a strategy to involve their customers in the stage of a product-development process. It has been a common practice in the company to welcome any comments from their agents for continual improvement purposes, before launching a new clothing line in the market. The company strongly valued the feedback from their registered agents nationwide, and it would definitely help them to identify marketable and saleable products compared to other competitors.

Figure 5.4 Flow process of sample making (Company F)



b) Documentation Systems

Generally, documentation system in both Company E and F was informal and limited to specific key processes. According to the interviewees, the existing documents were created and used by the employees to record the required information associated with jobs that have been done, also as a guideline and reference for others. However, the existences of these documents were based on the company's own initiatives, in terms of types of information and the details that were considered important to be recorded. In other respects, to what extent the documents have been controlled was not strategically planned.

According to Human Resource Manager Company E, the idea to establish the SOP's for each department was originally proposed by him after he joined the company in 2014. His previous working experiences in the large companies for almost 13 years imparted him with knowledge's and appropriate skills in the management of documents and records. Therefore, considering that Company E was left behind in the aspect of QM, he raised up this issue to be discussed further with the senior management. As a result, the plan was approved, and the details had been announced and explained to all Heads of Department (HOD) during the management meeting.

The HR Manager Company E shared his experiences on the existing documentations in the admin and human resources department. He stated:

"After I joined this company, I've made some observations on how each process was organised. Then, I started to think how all these weaknesses can be improved. Probably, the previous employee was not capable or never thought about it, hence nobody aware of the importance of SOP's and documentation system. For the time being, I have created several management forms, which related to the admin and HR department. Based on the common practice before, whoever want to leave the office during working hours, they just wrote their name in the log book. However, now, I have proposed to the senior management, any request to leave the office should be approved either by the HOD's or the General Manager. Our ultimate concern is the safety of our employees when they are not in the office within working hours either for company or personal matters. In case they are caught in an accident, we will have difficulties to claim from the Social Security Organisation (SOCSO), without an adequate evidence provided by the company."

This shows that the competent employees are the valuable assets in the company, whereas they would use their knowledge and past working experiences to help the

company to involve with continual improvement and shift to a productive environment. Although they were progressing to establish the SOP's for internal uses, HR Manager Company E asserted that it may take time to have everything done because of the commitment and efforts needed from the respective employees. Despite this, a continuous support from the senior management has predisposed the process owner to stay in focus in completing the tasks. The senior management believed that, the availability of procedures and quality records would standardise information to all employees at any level of management so that each process can be carried out consistently compared to the situation when the SOP's were unavailable. In that situation, it indicates that Company E was slowly moving towards better management of documentation systems.

On the other hand, Company F provided little evidence on the management of documents and records. According to the Business Owner, several forms were created for production daily use, but since they changed the wage system from piece rate to basic salary, the form that usually used by the sewing operators had been obsolete. It was found that the uses of documents were very minimum and they still in the phase of planning and developing a good system of documentations throughout the company. This situation might have resulted from the years of operation in business, size of the company and their major focus has been given to strengthen the strategies in day-to-day manufacturing and marketing. Pryor et al., (2010) reported small companies had been traditionally managed without documented routine processes and procedures. They also mentioned, limited knowledge and expertise amongst the employees have been identified as the barriers to adopting the systematic management practices. In addition, small companies were seen not as much comfortable with the formality of the QMS (Fai Pun & Jaggernath-Furlonge, 2012). Therefore, in the case of Company F, considering, they have just operated less than five years in the apparel business, it was observed that the aspects of documentations were not given as much attention. This shows a difference of QM practices in small companies compared to a company that utilised a standardise documentation system. The detailed case study demonstrates patterns of QMS between ISO-certified (Company A, B, C, and D) and non-ISO certified (Company E and F) garment companies. A summary of QMS implementation of all case study companies is shown in Table 5.7.

Table 5.7 Summary of QMS Implementation of Case Study Companies

Quality Management Implementation	Companies					
	A	B	C	D	E	F
ISO 9001:2008 certified company	✓	✓	✓	✓	×	×
Status of certification	Stop renewal	Stop renewal	Ongoing	Ongoing	Not Applicable	Not Applicable
Others international compliance	WRAP	WRAP BSCI	×	×	Not Applicable	Not Applicable
Main QM approach	Inspection	Inspection	Inspection	Inspection	Inspection	Inspection
Importance of inspection	1. Customer requirement and satisfaction 2. Human factor 3. Textile materials 4. The process in garment manufacturing	1. Customer requirement and satisfaction 2. Human factor	1. Customer requirement and satisfaction 2. Human factor	1. Customer requirement and satisfaction 2. Human factor	Customer requirement and satisfaction	1. Customer requirement and satisfaction 2. Textile materials and accessories 3. Human factor 4. Varieties of product specifications
Others QM approach	1. Training 2. Internal audit 3. Problem-solving techniques 4. 7 QC Tools	1. Training 2. Supplier Evaluation 3. Problem-solving techniques 4. 7 QC Tools	1. Training 2. Internship Programme 3. Internal audit 4. Problem-solving techniques 5. 7 QC Tools 6. 5S	1. Problem-solving techniques 2. Internal audit 3. 7 QC Tools 4. Supplier Evaluation	1. Training 2. Internship Programme 3. Supplier Evaluation	1. Training 2. Customer Satisfaction Feedback
Use of the advanced quality	×	×	×	×	×	×
Reasons not to use the advanced quality programmes	No requirement from customer	No requirement from customer	Lack of skill and knowledge	Lack of skill and knowledge & Human Factor	Not Applicable	Not Applicable
Impact of QMS adoption	Gradual Improvement	Nothing change	Gradual Improvement	Good Impact	Not Applicable	Not Applicable
Main reason QMS was challenging to sustain	Human factor	Human factor	Human factor	Human factor	Not Applicable	Not Applicable
Documentation systems	✓	✓	✓	✓	×	×

5.4 QC in the Garment Industry

The manufacturing industry utilises labour, different types of raw materials and machines to produce varieties of finished garments in order to fulfil market demand. Hundred to thousand pieces of garments are sewn every day by a number of workers who possess different levels of skills and capabilities in assembly lines. Therefore, maintaining a consistent quality in each single piece of garment can be extremely challenging. Furthermore, the sequential processes involved in the factory

may lead to the possibility of producing garments with either major or minor defects. Therefore, manufacturers set up a QC department and plan the QC activities throughout the garment production, to ensure each stage of the manufacturing process will be monitored and controlled systematically. As a result, a desired acceptable quality level could be achieved to satisfy the customers.

With regards to this case study research, the interviewees were not only asked about the department that in-charge quality in general, other questions such as the process of inspection, the standard and specification used, problems in production, training, Standard Operating Procedures (SOP), Key Performance Indicators (KPIs) and customer complaints were included as well as the interview questions.

5.4.1 Quality Department

Although the adoption of QMS has promoted the concept of TQM through the involvement of all employees to achieve desired end products, quality has been perceived as responsibilities of one specific department rather than the entire organisation (Brun & Moretto, 2014). In the garment manufacturing industry, it has been prevalent to see the quality department in the organisational structure of a company due to its labour intensive. The department was seen as the efforts made by the company to audit the internal processes during its operation, and improve them.

The Head of QC in Company C explained her viewpoint upon the above situation by making the following comment:

"During production, sewing operators have given too much focus to produce more quantities rather than thinking of the quality of sewn garments. Thus, we really need assistance from our QC inspector's team to check the garments and detect any quality problems before it becomes burden to the next processes."

All of the case studies companies have an established quality department either it was named as QC or QA, except Company D (ISO certified) and Company F (non-ISO certified). Table 5.8 shows the summary of the department's in-charge of QC processes in the participating companies. It was found that each company had their own mechanism and strategies to implement QC activities with the involvement of designated staff in their factory.

Table 5.8 Summary of quality departments

The department that responsible for quality	Companies					
	International Market		Domestic Market			
	A (Large)	B (Large)	C (Medium)	D (Medium)	E (Small)	F (Small)
Have Quality Department	Yes	Yes	Yes	No	Yes	No
Name of the Department	QC	QA	QC	Not Applicable	QC	Not Applicable
Other Department in-charge Quality	Not Applicable	Not Applicable	Not Applicable	Production	Not Applicable	Design & Marketing
Function of the Department	to conduct quality check from the stage of incoming materials to the final inspection prior shipment to the customers.	to conduct quality check during in-process and final inspection prior shipment to the customers.	to conduct quality check from the stage of fabric inspection to the final inspection prior delivery to the customers.	to produce finished garments	to conduct quality check from the stage of pattern making, to the final inspection prior delivery to the customers.	to conduct quality check during in-process and final inspection prior delivery to the customers.
Number of Staff	18	8	23	>100	1	1
Who's responsible? (Head)	Head of QC	Head of QA	Head of QC	Production Manager	QC Executive	Designer
Other QC Team's members	1. QC Accessories Inspector 2. QC Incoming Tube 3. QC In-line 4. QC Finishing 5. QC Heatseal 6. QC Packing 7. QC Final	1. QA Supervisor 2. In-process QC (IPQC) Inspector 3. Final Quality Audit (FQA) Inspector	1. QC Supervisor 2. Assistant Supervisor 3. QC Vendor 4. Assistant Lab 5. QC Inline (QCI) 6. QC Mobile	Not Applicable	Not Applicable	Not Applicable
Main QC Proceses	Inspection (random & 100% check)			Not Applicable	Inspection (random & 100% check)	

Usually, a group of employees are assigned as inspector to conduct series of quality inspection and then report the results to the Head of Department. They are able to recognise all categories of defects, detect any non-conformities during in-line and end-line inspection and take appropriate action, in order to assist the production team to eliminate the defects before going to the next operation. As indicated in Table 5.6, Company A, B and C (ISO certified) have a group of employees to perform the inspection, whilst Company E and F (non-ISO certified) relied only on one staff member for the QC tasks. Nonetheless, Company D (ISO certified) was the only case who completely relied on the sewing operators themselves to check the stitching and measurement while handling the garments.

According to the HR Manager of Company E, they have just set up the QC department in 2014, and employed an experienced candidate as a QC executive to be in-charge of the inspection at the stage of cutting until the finishing process.

Unlike Company E, a designer has been responsible for quality monitoring in Company F, whereby a random check on a few pieces of finished garments will be conducted for a particular style and design requested by customers. There were no standard operating procedures (SOP) established in both companies, and the method of inspection also was not standardised.

This might suggest that in both company E and F (non-ISO certified), the senior management dictates their own style of inspection for the bulk orders from customers based on the company's size and the requirement by customers. According to Goto and Endo (2014), most of the suppliers in the local-oriented market lack even the most basic skills and knowledge related to process technology such as inventory management, aligning of sewing machines, and quality control in the production process.

Amongst companies that have been certified with the ISO 9000 quality management system, Company D shared different stories of their QC activities. There was no quality department established in the company. The HR Manager of Company D gave her feedback on the department in-charge of quality. She said:

"The production department itself is responsible for quality. They have to make sure all garments are completely sewn as requested by the customers. So, when we have a customer walk-in, let's say she, or he would like to order a women's abaya (long-over garment) for 500 pieces, the production team will finalise the design, materials and colour of the fabric. The production manager and supervisor will ensure the quality of garment in terms of stitching, sizing and everything after production begins."

The above feedback was the same as the following comments had been shared by the Senior Production Manager of Company D.

"The production supervisor will be around in the tailoring department to monitor the sewing operators. It has been a common practice here that all sewing operators will check the cut pieces of garments they have received in a bundle before beginning the sewing operation. If there is something wrong with the garments, they will immediately let the production supervisor know about it for any further action to rectify the problems."

The above statements show that, although Company D did not have a formal QC team, they had created a system to educate the sewing operators to be more responsible when handling the cut pieces of fabric and the sewing machine. This is a

good practice to train them to work accurately, instead of work rapidly to earn more money (Brown and Rice, 2001).

However, each company employed different number of staff to work in the department, regardless the company's size (see Table 5.4). In terms of a number of staff available in both QC and QA department for Company A, B and C (ISO certified), the size and category of companies were not influenced the senior management to employ more QC or quality inspectors to check the garment's quality. Although Company B was considered as a large company and has the highest number of employees compared to Company A and C, there was only a group of eight staff that are currently employed for the QA department, to monitor quality of the international buyer's brands. As Company A and C had more number of staff employed in the QC department, each of them was assigned and placed at each section of production, including the fabric and accessories inspection. It shows that the QC team will be responsible for all types of process control adopted to manufacture garments as according to the quality requirement established.

In addition, Company C also recruited employees for the post 'QC Mobile' and 'QC vendor' to ensure the process of inspection would run smoothly, particularly during the months where the orders were increased substantially and at the same time they were out of their production capacity. In this situation, they would send the agreed quantities of garments to the appointed sub-contractors (local) for production. Once they received the finished garments from the suppliers, QC vendor will conduct an inspection to make sure the garments are free from defects. Meanwhile, QC mobile requires a multi-tasking job, whereby the person could be possibly works in all departments for the quality inspection, depending on the situation and which department need his assistance.

On the contrary, QA team in Company B began their inspection routines from the stage of sewing until the garments were ready to be packed for shipment. On the other hand, the warehouse section will conduct the inspection for the incoming materials that arrived from the supplier. It was found that, the number of staff was depended on the types of process control adopted, the level of inspection, and the most importantly due to the customer requirements.

5.4.2 Quality Inspection

Inspection has been predominant quality control processes in the garment industry, even though other advanced quality approaches were introduced and used substantially as the quality improvement initiatives. This study provided the empirical evidence in the aspect of types of quality programmes that was perceived useful in the Malaysian garment industry (see section 4.1.2 and 4.1.3 of Chapter 4) and the reasons of its usefulness for a large scale of garment manufacturing (see section 5.3.3 and 5.3.4a). Interviewees from all case study companies explained the process control adopted in their company respectively. Besides received feedback through the individual interview, the inspection process check list was used to gather information whilst the observation was made during the fieldwork. Based on the observation check list, the details of the inspection process in each participating company were summarised in Table 5.9. The details include the quality check points available, the background of QC inspectors, the working condition, the technology used and the inspection aids to assist their inspection.

It was found that company A, B (WRAP and BSCI certified) and C (ISO certified) were conducted a thorough quality inspection for their manufacturing process. As a contract manufacturer, company A and B established rigorous check points in each stage of garment production due to the stringent requirements and evaluation from the international buyers.

According to Admin Manager of Company A:

"Our inspection was based upon the customer requirements. There were customers who required us to conduct ten steps or eight steps of inspection. We have a customer who requested us to use a light box to check colour shading, but for other customers, it was unnecessary. Our customer, like Target requested us to inspect the first bundle that was completely sewn from the production, just to ensure the garment's quality is good. We also have different customers who only required us to conduct both an in-line and end-line inspection, without a first bundle check. It totally depends on our customers."

All QC in Company A would conduct inspection to all buyer's brand accordingly, based on the style and order number that were currently running in the production. On the other hand, the Head of QA of Company B explained that she and her QA team were assigned to carry out the inspection as according to the buyer. Therefore,

each of them individually was required to inspect the garments according to a buyer assigned to them for each operation while in the sewing assembly lines.

However, with only seven QA staff that was employed in the department, the Head of QA raised up the following issue. She highlighted:

"I will conduct the in-line inspection in the sewing department according to the buyers with the assistance from my QA team members. Although they were available to help me checking the garments, they also were rushing to inspect the samples from the sewing line for pre-production approval (PPA) sample. They must check the samples, because the inspection results are important prior starting a bulk production. So, most of the time, it was me who will conduct the inspection, check the operators and garments in the sewing line, one by one."

According to the above statement, as the Head of the QA department, she was totally involved in the inspection process whilst garments were sewn by the sewing operators and spent most of her time monitoring the quality in the sewing line. Although the main task of her QA team was to conduct the in-line inspection, sometimes they were not able to give full attention to the task, yet they also were required to check the sample. Her statement might imply that the job scope of her QA team and the number of staff that was currently employed for QA are unbalanced. As the compliance to customer requirements must be fulfilled, the quality check of few pieces of sample garments on the aspect of measurement, workmanship and appearance should be carried out from the sewing line for the pre-production sample status requirement. The sample was not only important for a new style and design, but it also required for all repeat orders from the buyers. This situation shows that Company B was established the control points at the early stage of product development due to the international buyer requirements. Therefore, the approved samples would indicate the capabilities of Company B to utilise its manufacturing resources to produce high-quality garments prior bulk production begins. It can be observed that the international buyers dictated the level of quality they want from the overseas producer or supplier.

Table 5.9 Summary of inspection Process in the Case Study Companies

Inspection Process		Companies					
		International Market		Domestic Market			
		A (Large)	B (Large)	C (Medium)	D (Medium)	E (Small)	F (Small)
Quality Check Points	Accessories	✓	✓	×	Production workers themselves will monitor and conduct quality check during each stage of operation.	×	×
	Fabrics	✓	✓	✓		×	×
	Spreading	×	✓	✓		×	×
	Cutting	×	✓	✓		✓	×
	Sewing in-line	✓	✓	✓		✓	✓
	Sewing end-line	✓	✓	✓		×	×
	Trim and inspect	×	×	×		✓	×
	Heat-seal	✓	×	×		×	×
	Finished goods	×	✓	✓		×	✓
	Needle/metal presence	✓	✓	×		×	×
	Packing	✓	✓	✓		✓	×
	Final inspection	✓	✓	✓		✓	×
AQL-based sampling		Yes	Yes	Yes	No	No	No
QC Inspector	Gender	Male	1. Male 2. Female	1. Male 2. Female	All production workers (male, foreign workers from India and Nepal, Language spoken: Hindi)	Male	Female
	Nationality	Foreign	1. Local 2. Foreign	Local		Local	Local
	Countries	1. Nepal 2. Bangladesh 3. Philipines	1. Philipines 2. Myanmar 3. Malaysia	Malaysia		Malaysia	Malaysia
	Language	1. English 2. Malay	1. English 2. Malay	Malay		Malay	Malay
Working Condition	Space	Adequate	Adequate	Adequate	Not Applicable	Adequate	Adequate
	Lighting	Good	Good	Good		Good	Good
	Level of noise	Low	Low	Low		Low	Low
	Working hours	8 hours	8 - 10 hours	8 hours		8 hours	8 - 12 hours
	Working position	1. Sitting 2. Standing	1. Sitting 2. Standing	1. Sitting 2. Standing		1. Sitting 2. Standing	1. Sitting 2. Standing
Technology used		None	None	None	None	None	None
Inspection Aids	Procedures	Yes	Yes	Yes	Yes	No	No
	Process Flowchart	Yes	Yes	Yes	Yes	No	No
	Inspection forms	Yes	Yes	Yes	No	No	No
	Customer Specification	Yes	Yes	Yes	Yes	Yes	Yes
	Master Sample	Yes	Yes	Yes	Yes	Yes	Yes
	Measurement tape	Yes	Yes	Yes	Yes	Yes	Yes
	Others	1. Manufacturing instruction 2. Approved fabrics 3. Approved accessories 4. Approved samples 5. Packing list	Buyers standard and specification	None	None	None	None

Although Company A and B were similar in the respect of company size, category of products, market and the international standard compliance, it was found that, they have adopted different methods and procedures for the quality inspection. Figures 5.5 and 5.6 show the processes flow of the QC for both companies as were documented in the company's SOP. This situation might suggest that although the international buyers have imposed many requirements for their orders to be produced by the selected overseas sub-contractor, contract manufacturers would ensure the quality standard for the export market are strictly controlled, maintained and improved. Therefore, sustaining quality of mass-produced garments would build a good reputation of their performance and remain competitive in business for a long term.

Despite the rigorous quality check points in companies that supplied the RTW abroad, Company C was also adopted a thorough process control throughout the manufacturing system, even they only catered demand for the domestic market. Looking back, Company C started its business as a contract manufacturer to the international brand names such as Adidas, GAP, JC Penny, Umbro, Oarsman and Nike in 1995. Few years later, once the senior management decided to only focus to manufacture their own brand of school uniform, they still adopted the similar QC approaches as required by the overseas buyers for their own clothing's brand. The involvement in the export market at the beginning of business, had provided them with valuable experiences in QM since they were able to set-up and planned resources needed for the QC department. Then, the department was systematically organised after the company was successfully accredited with the QMS 9001, ten years later.

In addition, Company C had provided this research with interesting findings when they utilised AQL-based sampling for garment inspection. Generally, AQL has been used as statistical sampling procedures during inspection for the export market. This might imply that the AQL's sampling approach could be adopted by the medium and small-size garment manufacturers, who supply to domestic market. The sampling procedures and AQL table for inspection provide a guideline to selection of samples and quantities of items required to pass and fail the inspection.

Figure 5.5 Quality control flow chart of Company A

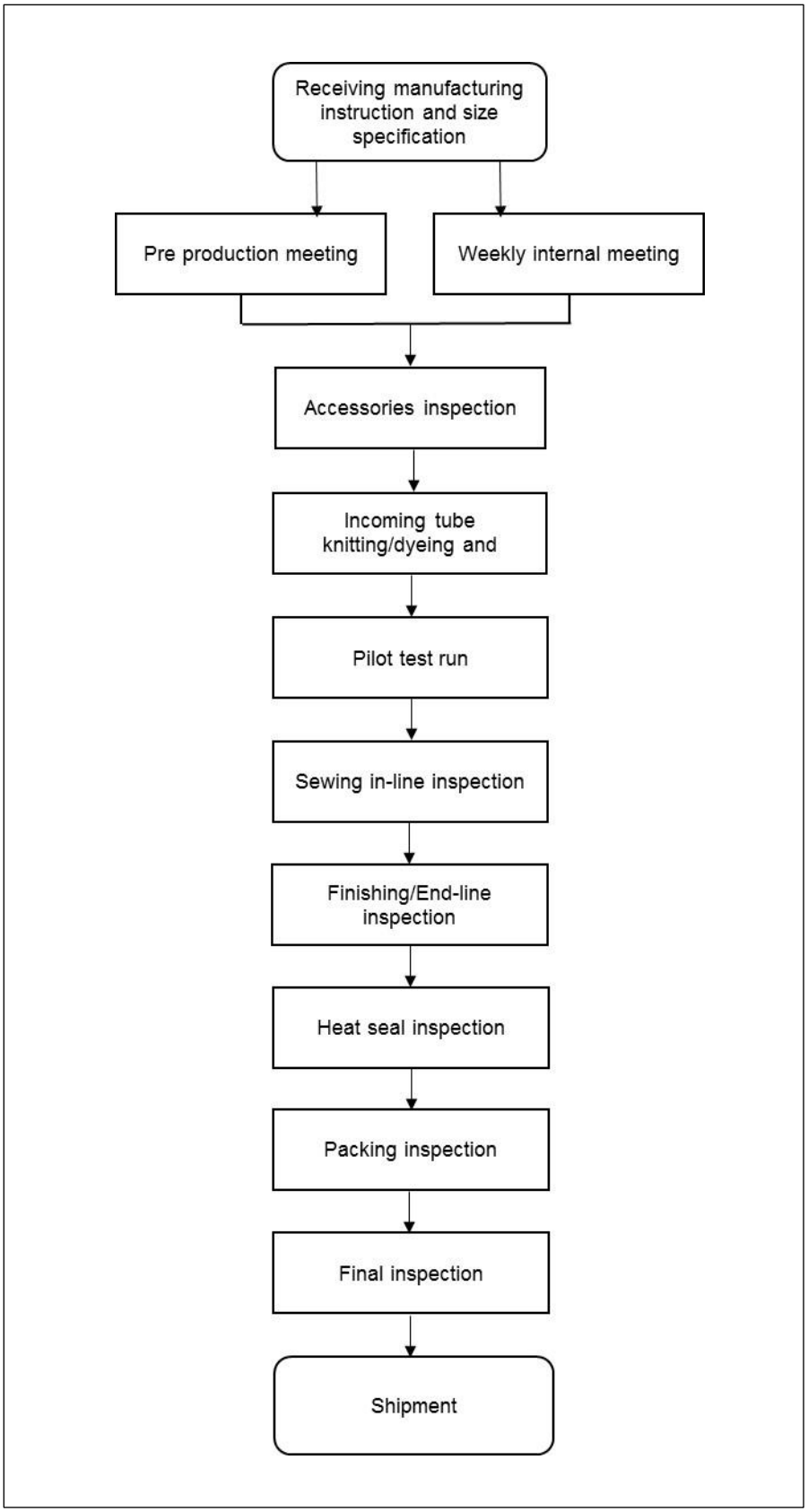
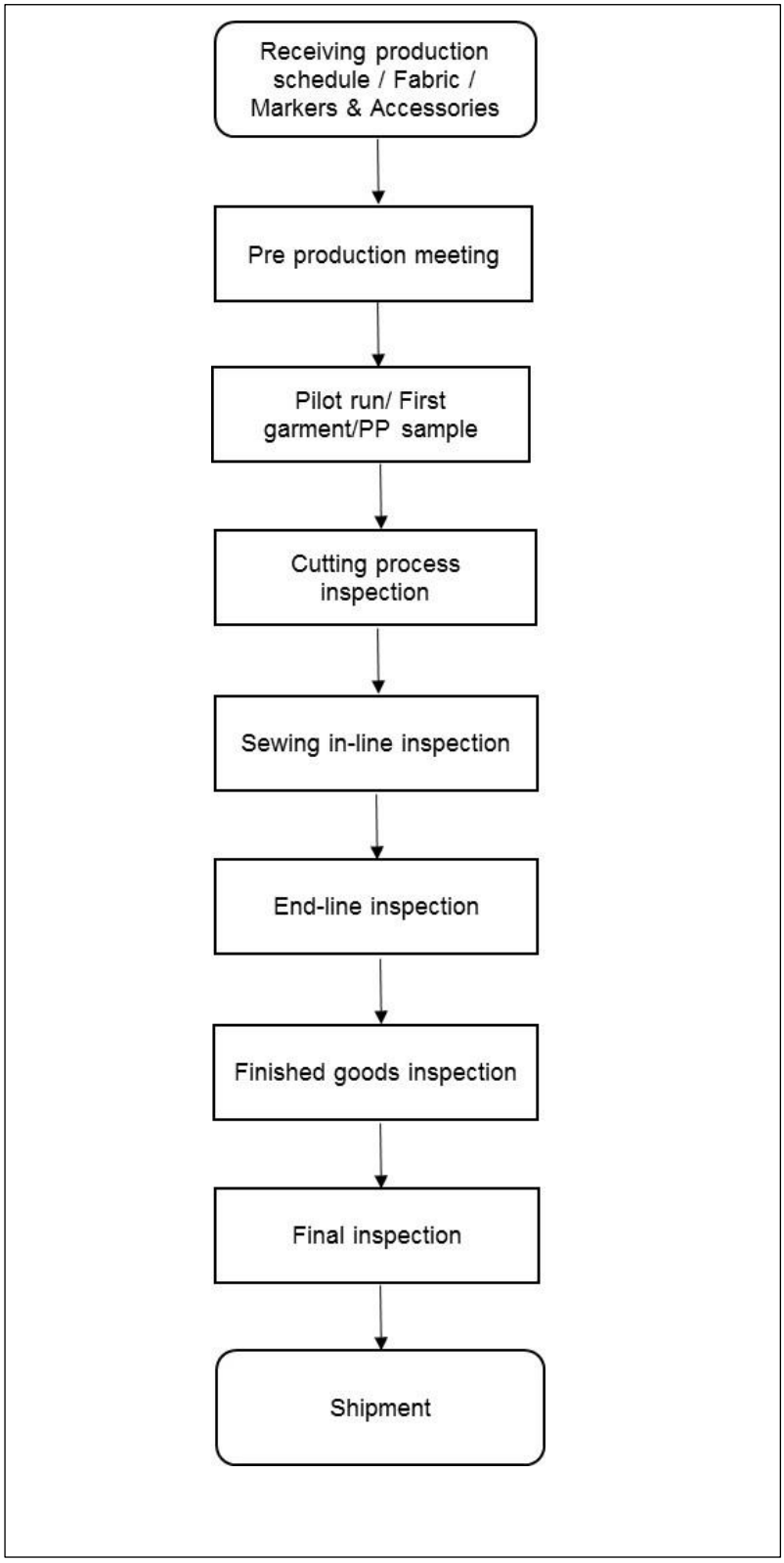


Figure 5.6 Quality control flow chart of Company B



Meanwhile, Company D as explained in section 5.4.1 was the only participating company that did not have a specific department and post for quality. As an ISO certified company, the SOP and flow processes were developed based on of the employee's job routine in the production. Although the HR Manager had brought up the literacy issues that were involving their foreign workers, the abilities of the senior and middle management to communicate with them using their language (Hindi), help to disseminate the quality requirements to all production employees. According to the Senior Production Manager of Company D, production operators in cutting, tailoring and finishing were trained from the beginning to be alert all the times with the garments they were handling with. Thus, whenever they receive the bundles, they will inspect the garments before beginning the job. The manager or supervisor will be informed immediately if any defects were found for rectification.

Sharing the clear picture of quality monitoring in Company D, she explained:

"We started QC from the cutting process. Once finished, the cut pieces that were tied in bundles will be sent to the tailoring section. Here, each operator will inspect the bundle to ensure the garments (cut pieces) are free from defects before they start sewing. All finished garments will go to the next section afterwards, for buttoning, attaching hook and ironing. In this finishing section, operators will check overall condition of the garments, while ironing operators will ensure there is no puckering along the seam line, which would make them difficult to iron and have a smooth surface of the seam at the same time. If the seam puckering is too obvious, the garment will be returned back either to the cutting section or tailoring for necessary action taken by the supervisor."

The practices of quality inspection in Company D has built a positive working environment, whereas all employees realised their roles and responsibilities to achieve company's desired quality. Furthermore, the teamwork amongst them would maintain because they tend to help each other to minimise the quality problems.

Meanwhile, the inspection process in Company E and F were not as thorough as compared to Company A, B and C. QC activities were carried out accordingly, but it was remained informal and not documented. This situation might due to the fact that both companies did not adopt with the QMS, and yet they were only supplied to the domestic market. Again, when the SOP and other related documents are unavailable, it become much harder for the employees to work consistently and produce the same results.

Overall, it can be observed that each company utilised different methods of inspection as shown in Tables 5.10 and 5.11. Although some companies were carried out the similar QC processes, it was found that the sample size and frequency of inspection, controlled points, the person in-charge of that particular processes and documents used were totally different amongst those companies.

Furthermore, companies for export market utilised various inspection aids, such as procedures, process flow chart, forms, check lists, samples, customer measurement specification and manufacturing instructions compared to the companies that supplied domestically. It would appear from the results that garment manufacturers developed their own process control based on the company's target customers, the competencies and knowledge of their internal customers, also the QMS and others international compliance they were adopted. More importantly, customer requirements might predispose the manufacturers to plan and recruit the human resources needed for the QC activities, whether it would involve the QA and QC team members or the employees from other departments. This indicates that all of these factors would guide the company to strategically plan and develop their own inspection procedures to be aligned with the customer's quality requirements and as part of the continual improvement activities. Therefore, any of root causes that may lead problems to garment's quality could be identified, and the efforts could be made to rectify the problems before the garments were completely produced.

Table 5.10 Methods of quality inspection in Company A, B and C

Companies	QUALITY INSPECTION IN GARMENT MANUFACTURING					
	Process	**Sample size/Frequency**	**Controlled points**	**Instrument/ Method**	**Responsibilities**	**Records/ Reference**
A	**Accessories inspection**	10% of received quantity	Based on approved swatch in Manufacturing instruction	Visual	QC Accessories Inspector	Accessories inspection report
	In-coming tube knitting/ dyeing and printing	10% of received quantity	Based on customer approval, style number, purchase order, size, quantity and colour	Visual	QC Incoming Tube	Incoming tube inspection report
	Sewing in-line	**AQL1.5**	Sewing workmanship and measurement	Visual, Measurement tape, Sewing machine	QC In-Line	In-line inspection report
	Sewing end-line	10% of received quantity	Sewing workmanship and finished measurement	Visual, Measurement tape	QC Finishing	Finishing inspection report
	Heat-seal inspection	Not specified	Colour, symbol, letters and temperature	Visual, Heat seal machine	QC Heat Seal	Heat seal inspection report
	Packing inspection	10% of received quantity	Based on packing requirement and sample approved.	Visual	QC Packing	Packing inspection report
	Final inspection (after 80% packed)	**AQL 2.5**	Workmanship, finished measurement, packaging requirement	Visual, Measurement tape	Final QC / QC Buyer	Final audit inspection report
B	**Accessories inspection**	1 -2 packet	Based on the fabric and accessories inspection guidelines	Visual	Store Operation Executive	Accessories inspection report
	Fabric inspection	10% of received quantity		Visual, Fabric inspection machine	Store Operation Executive	Fabric inspection report
	Spreading	Every marker layout	Based on the Layout Marker Label	Visual, Spreading machine	IPQC Inspector	QA process monitoring checklist - Cutting form
	Cutting inspection	1 inspection per day per operation	Based on the criteria in QA Process Monitoring Checklist	Visual	IPQC Inspector	QA process monitoring checklist - Cutting form, Daily cutting report - cut pieces performance
	Cut piece sorting	Every cutting, 3 cut pieces (top, middle, bottom)	Production paper	Visual	Cutting Supervisor	
	Sewing in-line	50pcs once per day per operation	Sewing workmanship and measurement	Visual, Measurement tape, Sewing machine	IPQC Inspector	IPQC report
	Sewing end-line	100% inspection	Sewing workmanship and finished measurement	Visual, Measurement tape	Not specified	End-line process inspection report
	Finished goods inspection	5 pieces per bundle, if 1 piece rejected, 100% inspection shall be conducted	Based on finished measurement requirement and production paper	Visual, Measurement tape	FQA Inspector	Daily inspection records
	Final inspection	**AQL 2.5**	Based on finished measurement requirement and production paper	Visual, Measurement tape	FQA Inspector / Buyer QC	Final inspection report
C	**Fabric inspection**	Random check	not specified	Visual, Fabric inspection machine	Fabric Inspection Operator	Fabric inspection report
	Spreading	Random check	Based on marker label	Visual, Spreading machine	QC In-line	Cutting report (layering and bundling)
	Cutting inspection	Random check	Style, size, quantity, shape	Visual		
	Sewing in-line	7 pieces per bundle per operator	Sewing workmanship and measurement	Visual, Measurement tape	QC In-line	In-process inspection from (daily)
	Sewing end-line	**AQL 4.0**	Workmanship and finished measurement	Visual, Measurement tape	QC In-line	QC measurement report
	Finished goods inspection					
	Packing inspection	30% Random check	Based on packing requirement and sample approved.	Visual	QC In-line	Packing inspection report

Table 5.11 Methods of quality inspection in Company D and E

Companies	QUALITY INSPECTION IN GARMENT MANUFACTURING					
	Process	Sample size/Frequency	Controlled points	Instrument/ Method	Responsibilities	Records/ Reference
D	**Cutting**	Random check	Measurement	Visual, Measurement tape	QC Executive	No standardise forms
	Sewing in-line	Random check (3 inspection per day)	Sewing workmanship	Visual, Measurement tape	QC Executive	
	Trim and inspect	100% inspection	Sewing workmanship and finished measurement	Visual, Measurement tape	Production team	
	Packing	Random check	Based on delivery order	Visual	Packing inspector	
F	**Sewing in-line**	Random check	Sewing workmanship	Visual	Designer	No standardise forms
	Finished good inspection	Random check	Finished measurement	Visual, Measurement tape	Designer	
D	There are no established routine procedures related to QC					

5.4.3 Statistical Sampling for Inspection

Although quality inspection has been predominant QC activities in the garment industry, the methods of inspection in companies varied due to particular reasons. The study found that the participating companies adopted different inspection methods and sampling techniques as shown in Table 5.10 and Table 5.8 of Section 5.4.2. Unlike 100% inspection which requires the inspection of every single piece of garments, random inspection based on the Acceptable Quality Limit (AQL) referred to a different sample size to dictate the quality of all units in a shipment. AQL-based sampling which is very common amongst the export-oriented companies is the statistical sampling procedures which conform to ANSI/ASQ Z1.4-2008 and ISO 2859-1 sampling plans as a guidance to the company on the inspection procedures in order to achieve the AQL stipulated by the international buyers. An Addition to the survey results in Chapter 4 (Section 4.1.4) that shown garment companies used either an AQL-based sampling or the company's own sampling procedures for the garment inspection, several questions pertaining to the sampling procedures were asked to the interviewees. The information provided by all case study companies explained to what extent the manufacturers satisfied with their own choice of sampling for garment inspection, besides understanding the issues emerged from Company A, B, and C which adopted an AQL-based Sampling and Company D, E

and F that comfortable with their own sampling procedures (non-AQL). Table 5.12 summarises statistical sampling procedures adopted by all companies.

Table 5.12 Statistical sampling for garment inspection

Sampling procedures for garment inspection	Companies					
	A	B	C	D	E	F
	Large	Large	Medium	Medium	Small	Small
	Export	Export	Domestic	Domestic	Domestic	Domestic
AQL-based sampling	✓	✓	✓	x	x	x
Reason to use AQL or company's sampling procedures	Customer requirements for export	Customer requirements for export	1. The company adopt inspection procedures for export to the production of their own clothing's brand.	1. Sewing operators sew and check garment's quality at the same time.	1. Inspection procedures are based on a daily routine of inspection.	1. Inspection procedures are based on a daily routine of inspection.
			2. Effective for large quantities of RTW garments with the same specification and continuous batch of production.	2. Availability of 'helper' to inspect the garments.	2. 100% final inspection	2. 100% final inspection
			3. 100% inspection is time consuming.	3. Zero knowledge in AQL	3. Zero knowledge in AQL	3. Zero knowledge in AQL
QC inspectors are competent to conduct inspection	Yes	Yes	Yes	Yes	Yes	Yes

5.4.4 Common Problems in Garment Production

The biggest challenges to implement quality in the garment manufacturing industry are because it has been extremely labour-intensive and comprised of sequential processes to produce various styles and design of RTW apparels. Additionally, the garment's specifications developed for each style were varied, hence it requires knowledge and skills of the production employees to handle different types of fabric and accessories, sewing machines and finishing processes. Therefore, the manufacturers should ensure their operational divisions to understand completely the customer specifications, in avoiding any misinterpretation of instructions and requirements before production begins.

The questions regarding the common problems or defects during production and any quality issues related to the inspection process were asked to interviewees in order to understand the major problems they had, in related to all elements in the manufacturing in the respect of peoples, machines, materials, methods and the environment. All case study companies agreed that quality issues were inevitable in garment manufacturing even though some of them were international compliance

certified companies and have utilised standardised QC procedures as a mechanism to control the quality of incoming materials until the finished garments were produced. Table 5.13 summarises the common problems found during the manufacture of garments amongst the participating companies.

Table 5.13 Summary of the common problems in RTW production

Common Problems in Clothing Production	Companies					
	A	B	C	D	E	F
	Large	Large	Medium	Medium	Small	Small
	Export	Export	Domestic	Domestic	Domestic	Domestic
Production System	Mass-production	Mass-production	1. Mass-production 2. Made-to-Measure	1. Mass-production 2. Made-to-Measure	1. Mass-production 2. Made-to-Measure	Mass-production
The main quality Issues in Production	**Fabrics:** 1. Shading 2. Dyeing defect 3. Stain **Sewing:** 1. Broken stitches 2. Puckering 3. Open side seam 4. Messy stitching 5. Stain	**Sewing:** 1. Measurement	**Fabrics:** 1. Stain **Sewing:** 1. Broken stitches 2. Puckering 3. Loose stitches 4. Skipped stitches 5. Inconsistent Seam	**Cutting/Sewing (MTM):** 1. Measurement 2. Incorrect cutting	**Cutting/Sewing (MTM):** 1. Measurement 2. Incorrect cutting	**Fabrics:** 1. Shading 2. Improper cutting
Root causes of the problems	Man	Man	Man	Man	Man	Man
Quality Issues faced by the QC Inspector	1. Communication barrier	1. Communication barrier 2. Lack of sewing skills	None	Not applicable	Sewing operators reluctant to follow the instruction from Supervisor/QC.	lack of knowledge and skills / communication

It was found that most of the quality issues were caused by human errors, which led to the ineffectiveness and lacking in the production systems. The detailed case study also revealed that, the more resources or inputs for manufacturing available in a company, the higher the possibilities of a company to deal with quality problems. Based on the feedback that was highlighted by all interviewees, the following quality issues were explained according to the concepts in the production systems adopted by each company, which are mass production according to the standard sizing, and made-to-measure (MTM).

a) Quality issues related to mass production as according to the standard sizing

The concept of mass production for RTW apparels is to produce large quantities of finished garments in a full-size set, before the retailing aspect begins. It has been prevalent to the international buyers to involve in off-shore production, whereby the overseas contract manufacturers would provide them with an adequate labour,

machineries and materials to produce their clothing brands. This multiple case studies show that, although the compliances to the international standards were fulfilled, the contract manufacturers (Company A and B) were still struggling to control the desired quality of products and processes in their manufacturing plant. Despite the arrangement of process control in every stage of apparel production to meet the customer requirements (see Figures 5.5 and 5.6, pages 145-146), both confronted with several problems that were frequently occurred in their companies.

According to the Head of QC of Company A, colour shading, dyeing defects and stain were the common defects found associated with fabrics they received from the appointed suppliers. Although stain or dirt mark usually can be detected during the fabric inspection, which is the major problem in the textile mills, she highlighted that the defect was found while the transportation of the bundles from one process to the next process. Based on the current situation that had been explained in Section 5.3.3 (page 129– 130), she then added the following statement to show that the stain on the garments was uncontrollable defect.

She emphasized that:

"If you go to production, you'll understand the process. I cannot control the stain. But how to avoid? The bundles were transported to upstairs and downstairs so many times. I could not guarantee my quality 100% perfect."

Besides stain, there were also defects in the sewing assembly line such as broken stitches, seam puckering, open seam and messy stitching were found during inspection. This information was based on the feedback from both the Head of QC and QC inspector when they were asked the same question about the sewing problems. The Head of QC viewed those problems as the weaknesses in the aspect of HR. Although she initially believed that the problems in production were caused by the machines and procedures, she finally agreed that the issue with *human* was the main root cause of the problems.

The above situation was similarly occurred in Company B. In Section 5.3.1 (a - e) of this Chapter, the HR Manager was raised the problem associated with the workers towards the implementation of QM in Company B. Additionally, the Head of QA as well was provided the same feedback on the major challenges to maintain the QM throughout the company, particularly when she encountered the sewing problems.

Although the common problem appeared in the production was a wrong measurement rather than seam and stiches defects like in Company A, she noticed there was a negative attitude amongst the production workers when the QA team can detect the problems and want them to correct the mistakes.

Based on her experiences monitoring the quality of garments in the sewing assembly line, she asserted:

"For your information, the sewing operators and the supervisor give priority to produce more quantities of garments rather than concerning the aspect of quality. It was the real challenge here, and very complicated to solve."

This statement indicates that the effectiveness of QM in the manufacturing process requires not only the involvement of peoples who are competent to run the operation, but it also demands a good teamwork amongst all the employees. Without the aspect of teamwork, it would be difficult for both senior and middle management to communicate clearly the company's quality objectives and disseminate the customer's quality requirements efficiently as there was no co-operation gained from the production team. Consequently, the efforts and initiatives towards quality would not be succeeded. This might imply that, despite the 'human' factor which has been the most valuable asset in the labour-intensive industry, in other perspectives, garment manufacturers should reinforce strategies to ensure all of the employees would have the same mission to achieve the company's quality goals. The manufacturing environment, whereas each management levels work individually rather than in a team would not navigate to a successful direction to quality management.

Additionally, since Company A and B employed foreign workers for the manufacturing divisions, the interviewees from both companies brought up the issue of communication barrier amongst them and this situation to some degree have made the QC activities were not work smoothly due to misinterpretation of working instruction.

One of QC Inspector in Company A (Filipino) shared his point of view on the above issue he faced during the process of inspection. He stated:

"Most of the workers here, have preferred to speak in Malay rather than English language, because they not understand English at all, except for the simple words such as 'yes' or 'no'. Besides, some of the in-line QC and the line leader were not proficient in English as well. Thus, this situation made our daily conversation became difficult, because they were not able to understand me, and at the same time, it hard for us to have a proper discussion and exchange information due to the language barrier."

It shows that contract manufacturers who employed foreign workers were also faced with communication problem when almost all the production workers were not able to speak in English, even though they knew that some of their superior and colleagues employed, as well the buyer QC tend to use English language. Interestingly, the foreign workers preferred to learn and speak in Malay and seem comfortable used the language for daily communication with their supervisors and all management levels of employees. This situation might suggest that the foreign workers choose to use the language of the country they migrate into because of their long-term employment contract, so that it would help them in daily communication with local people either during or after working hours. This case study also provide evidence that the migrate workers were not

Meanwhile for companies that supplied domestically (Company C, D and E), they also encountered with quality problems in relation to fabrics, cutting and the sewing process. According to Company C's Head of QC, since the school uniform for girls and boys, and the headscarf were made of poly-cotton white fabrics, the problem with stain cannot be avoided. Based on the QC daily inspection report, the sewing defects such as broken stitches, seam puckering, loose stitches and skipped stitches were the common defects found during the in-line inspection. The Company C's Head of QC also agreed that the 'human' factor was given impact to the quality of the finished garments because most of the sewing operators concentrated to produce more quantities of garments, for their monthly wage.

On the other hand, Company D did not experience with much quality issues during manufacturing, except if the management decided to receive order for made-to-measure as explained by the Senior Production Manager (see Section 5.4.3b). Realising there were many complaints received from customers who were dissatisfied with the measurement and fit of the garments, they have decided to stop made-to-measure orders which requires the individual customer's body

measurement (see Section 5.4.3b). However, she also highlighted the issue with 'human' factor when sometimes the sewing operators were reluctant to follow the instruction given by the supervisor. She gave the following comments:

"Sometimes the sewing operators won't listen to the supervisor's instruction. If there are problems which need them to stop sewing and rework on the defective garments, they also refuse to do it. Therefore, the supervisor usually helps them to open back the stitching before the next process of rework. This was happened last time, when the operators were paid using the piece rate system. Supervisor will also ask helper's assistance since they were paid using basic wage system."

It was found that although several companies (A, B, D and E) decided to change the wage system from piece rate to basic because of the quality issues, in opposite, the Company D's Senior Production Manager preferred the operators to be paid using the piece rate rather than the basic wage system. She shared her viewpoint:

"I much prefer the piece-rate system compared to basic wages because the sewing operators will be more productive. Usually, they will tend to work slowly during the standard working hours, starting from 8.00am to 6.00pm. Right after 6.00pm, they would perform the job much slower to gain more overtime pay. This is happening now when they were paid using basic wages. However, differs with a piece-rate system, the operators became more productive and speed their job based on the rate given for each particular style of garments they sewn. In terms of quality, there were none of the big issues arose, because they followed exactly the samples and tried to eliminate any sewing defects. But, if they careless and make mistakes, they would be fully responsible for the problems, otherwise the alteration should be carried out without any payment for the quantities rejected. Therefore, they would sew the garments carefully and correctly in order to minimise as much defects as possible."

Furthermore, she added:

"In my opinion, a piece-rate wage system is better to be implemented here. For instance, one skilful operator able to sew 'kain sarung' (long skirt) approximately 100 pieces per day, starting from 8.00am to 8.00pm. However, after the company changed to basic wages, the operator only capable to produce half of the targeted quantities."

Nevertheless, the QC Executive of Company E provided an opposite feedback on the piece-rate wage system. According to him:

"Based on my observation, the sewing operators were eager to produce high quantities of garments because a piece-rate system. Thus, many of them had set a target on the number of garments should be produced daily. Hence, they tend to work rapidly to achieve the target and to generate more income for that particular month. In that situation, some of them just ignored the quality problems found during

the production because for them, the process of rework and alteration would only delay the sewing operation."

Meanwhile, as a small company, Company F changed the piece-rate wage system to basic wage because to standardise the monthly pay for all sewing operators, due to the business expansion and massive orders from their customers. According to the Business Owner, the basic wage system would ease the production to calculate the monthly pay of each operator depends on the production planning that has been scheduled earlier for that particular month. Despite the pros and cons of a piece-rate system highlighted by Company D, E and F, the senior management of all participating companies for sure had the reasons of the most suitable wage system to be applied in their company eventually.

According to the Business Owner of Company F, they ever experienced several quality issues associated with the fabrics and cutting process. Considering that the company has just operated less than five years in business, lack of technical knowledge and expertise generally in textiles and specifically in the garment manufacturing amongst the employees were the obstacles for them to maintain a consistent quality during the production of women's RTW, especially to manufacture garments from their customers.

She said:

"We had a customer before who would like to mass-produce their own brand of children's wear. They provided the measurement specification with the materials (fabrics) and requested us to produce only one sample for them, which was size L prior approval for bulk orders. Then, after the photo shoot session, they were satisfied with the sample and automatically agreed to proceed with mass production for all sizes. Unexpectedly, we found a big problem related to the measurement of the finished garments, whereby the measurement for each garment's size was not within the measurement specification given by the customer. After did some investigation, we realised that the major cause to the problem was due to the type of fabrics sent by the customer. The measurement specification used by them was actually developed for woven fabrics, instead of knitted types. As a result, when we did the inspection and measured the finished garments, almost all of them were out of specification. This incident was a lesson learnt for both of us in the aspect of fabrics used for manufacturing."

She also added:

"Another QC problem we ever experienced was lacked communication between the designer and the cutting operator before the cutting process begins. I noticed that the

designer was simply adjusted the pattern measurement onto the cutting paper (marker) and assumed the cutter himself could understand the adjustment made. I asked the designer, whether the cutter understood her hand writing or not, once she did the manual adjustment on the marker. However, she can't give me the answer which shows that she was not sure on the action taken. It is such a waste of time, the energy and fabrics used when it was improper cuts."

Company E also faced with some risks when they received fabrics from the customers for all orders, except to manufacture their own brand. Sometimes, the fabrics sent to them contained variation in colour tone between two or more rolls of fabrics, and they just realised about the problem, right after the garments were completely sewn, which was too late. Moreover, without a fabric inspection conducted in their factory, it was difficult to detect any fabric defects from each fabric's roll from the customers before the spreading and cutting process begins. However, the Business Owner said that all the quality issues arose including the problems caused by poor handling by the operators, given them an exposure and new experiences to cope with the unexpected problems during the production and also made them aware of the same problems in the future.

This case study indicates that small manufacturers usually lack of competent employees who possess a background in the textile and clothing-related area recruited in their company, and since they haven't adopted to QMS as yet, the process flow in the production was disorganised. Thus, without a SOP, process flow chart and the guidelines, employees tend to perform jobs based on his or her own rationale and might develop an inconsistent routine. This might suggest that the knowledge, technical background and expertise related to textile technologies amongst the employees are extremely important, even to apply in a small garment manufacturing company. Additionally, the company should ensure the information from one department to the other department is well articulated to eliminate misinterpretation before the production takes place. Again, although the adoption to QMS is an option to any organisation as one of the strategies or an approach towards quality improvement, this situation might suggest that small manufacturers should consider the QMS certification for a good start in management of the documentation system.

b) Quality issues related to made-to-measure (MTM)

The case study shows that quality issues arose in companies, which utilised made-to-measure system for their garment production were differed with the companies that adopted mass production. Company E, a small manufacturer who totally used the MTM production system employed approximately 20 operators to sew the garments based on the individual body measurement of their customers. Besides Company E, it was found that Company C and D also have been involved in this production system as well. However, according to the interviewees, MTM has not been the main production system in both companies, whereby in Company C, the production was based on the demand from the government and corporate agencies. Meanwhile, Company D was no longer taking orders for MTM due to several quality issues that gave burden to the production team.

Considering the findings supplied by these companies (C, D and E), it was found that garment manufacturers who utilised MTM system faced problems associated with measurements and a cutting process. Although the purpose of MTM is to produce the garments that fit the body of individual customers instead of referring to the standard sizes, manufacturers still received complaints from the customers due to their dissatisfaction on the fit and comfort of the finished garments.

Company E's QC Executive who had 25 years experiences in garment production made the following comment:

"Here, we have provided samples (shirts and pants) in a complete size set for our customers to try before choosing the most suitable size that fit them. However, they always like to be served. Therefore, we take the individual body measurements for their satisfaction."

Dealing with numerous projects and received orders from the government and private agencies enabled them to store various types of samples that were mostly in the same category of clothing, such as professional work wear and the corporate uniform. Although the customers in Company E can identify their suitable clothing size, based on the samples available in all sizes for both men and women, they still preferred to be measured by the technical team members. The QC Executive of Company E summarised the problem he encountered during the production, by providing the following feedback. According to him, the measurement issues have

been much critical, occurred in Company E, compared to problem with the specification. He asserted:

"There are two main reasons of quality issues in the production, either it caused by a measurement or specification. If there is any issue associated with measurements for instances, such as the length, waist, hips, and crotch (pants), it actually involves the person who take the customer's body measurement. However, if the problems found were broken stitches, skipped stiches, wrong company's logo and slanting pocket, it was associated with specification."

Meanwhile, the Senior Production Manager of Company D, who had a similar experience with MTM production, said:

"Usually, MTM orders will burden us with a lot of problems. That's why, for the moment, we are no longer take any order for MTM. The cutting process was a little bit problematic compared to sewing because of incorrect cutting due to the wrong measurements. Moreover, all our cutters and sewing operators are foreign workers. They did not get used with Malaysian fashion design and specification. Furthermore, we did not have an experienced and skilful worker to take body measurements. We are currently stop accepting orders from MTM because we don't want it occur repeatedly."

Considering the quality issues in MTM production, both Company C and D, have conducted 100 percent inspection to ensure the measurement of finished garments are the same as the written specification. It shows that the garment manufacturers have given more attention to the quality of the garments produced by using MTM, even though the quantities of MTM orders were not as many as orders for mass production. Therefore, the individual customer satisfaction can be achieved.

It also understandable that without a strategic quality planning, proper process control and problem-solving analysis, manufacturers would continually receive complaint from the customers. As happened in Company E, the Sales Executives gave her feedback regarding the complaint made by the customers after they received the finished garments. She said:

"It was common to receive complaints from the customer, even though we have been custom-made their clothing. Normally, we received complaints regarding the fit of the clothes. Some women's customers dislike when the clothes are loose, whereas we have already followed the standard specification given by their company's management. Meanwhile for men, the complaint was mostly associated with the fit of the clothes at the chest part and there were cases when they ever claimed that the finished clothes looked similar like the women's silhouette. However, these complaints were not occurred all the times."

Since the Sale Executive has been responsible to liaise with the customers regarding any complaints received, the statement given earlier by the QC Executive, shows that they all were aware of the measurement issues encountered in their company. Based on the QC Executive observation, he identified the root causes to the problem. He highlighted:

"I found that some of our staff who responsible to take body measurements not communicate efficiently with the customers. There was no communication between them, hence they probably missed some important information related to the points of measurements and any early feedback from the customers. If they take a chance to ask the customers few questions while measuring their body, it would give advantages to them, what to do before the production starts. Another point is that our staff still lack of skills and knowledge in body measurement. Therefore, they couldn't predict any consequences if the measurement was wrongly taken."

The interviewee made the above statement because some of the technical team members just recruited, and they were not experienced in this field. Analysing the quality issues in MTM production, despite the measurements, incorrect cutting, skill and knowledge of production workers as well as a communication problem, it was clear that the MTM's companies agreed that the quality problems they encountered were caused by a human factor.

Despite the quality issues with human brought up by all companies, the research shows both group of companies that utilised mass-production and MTM faced with different quality issues involving the materials and methods for garment production. Additionally, QC inspectors identified several challenges to perform their job such as the communication barrier with the foreign workers, lack of teamwork, technical knowledge's and the appropriate skills needed for the production.

5.4.5 Training and other Quality Initiatives

Employee's competencies are valuable in any organisation, and therefore, it helps the manufacturing processes to run efficiently. Employees would achieve a consistent knowledge and skills through various trainings, workshops or short course, combined with their past working experiences. A scheduled in-house and external training would be beneficial for career developments for all employees, may enhance their job capabilities and lead to the empowerment in decision making. As QC activities have involved stages that required decision- making process in determining the samples for inspection, defect's classification and the inspection

results, it’s imperative to conduct or send the employees for training. This is to guide them in making the right decision in any situations while involving the quality issues. Thus, they were capable to carry out the inspection independently.

Therefore, few questions related to the training were asked to the interviewees in order to explore the employee’s competencies in the area of QA and QC. In addition, the feedback from interviewees explained to what extent the training has been successfully provided to the employees. The study shows that all case study companies planned and imparted a required knowledge’s and skills to the QAQC employees based on the training’s need. The training not only enable them to acquire new knowledge’s and skills, but also to refresh what have been known to perform the job. However, each company adopted different management system towards the implementation of training. It can be observed that the internal trainings were much preferred compared to the external training, whereas all of them agreed that most of the trainings were conducted informally. Despite the fact that QAQC department often initiated quality initiatives, it was found that all case study companies were not actively engaged with other quality improvement activities in the department, except for the export-oriented companies. Both company A and B were driven by the international buyer’s requirement to carry out the quality improvement programmes. The information related to training for QAQC personnel in all companies is summarised in Table 5.14.

Table 5.14 Training in the area of quality assurance and quality control

Training for Quality Assurance and Quality Control (QAQC)		Companies					
		A	B	C	D	E	F
		Large	Large	Medium	Medium	Small	Small
		Export	Export	Domestic	Domestic	Domestic	Domestic
In-house training	Formal	✓	✗	✗	✗	✗	✗
	Informal	✓	✓	✓	✓	✓	✓
External training		✓	✗	✓	✗	✓	✗
Frequency		Occasionally	Rarely	Rarely	Rarely	Rarely	Rarely
Driven by whom?		Senior Management or Head of Department will identify the training's needs			Relied on the experiences of the employees		
Any other quality initiative to improve quality?		Based on the customer requirements	Based on the customer requirements	No	No	No	No

The in-house training conducted was not only purposely to teach them on the defect's classification and how to record it, but also involved training on the right techniques to measure different types of garments based on the measurement specification. Since Company A still maintained the documentation system based on the QMS ISO 9001, the requirements for HR were implemented accordingly, for instance, in the aspect of employee's evaluation. It was found that, the employee's performance was monitored, once they were completely attended the training, to identify whether the training was effective or otherwise. During the interview with one of the QC Inspectors in Company A, he was able to categorize several mentioned defects into major and minor based on his knowledge and experience. The quality records such as on-job training for individual and group training were available. Additionally, the Head of QC conducted the informal training during the weekly meeting to ensure all her staff have a good understanding on certain issues involving the inspection procedures. It shows that the QC team was well-trained, and their job competencies were evaluated as according to the guidelines in the QMS ISO 9001.

In Company B, although they also served the international buyers, training amongst the QA team members was rarely conducted. Based on a small number of staff

(eight of them) recruited for the QA department at that moment, the senior management might assume that they have already competence to carry out the inspection, considering their length of service in Company B and other experiences. According to the Head of QA, her staff normally received the informal training during the final audit that was conducted by the buyer QC. It was prevalent that one or more QA staff to assist the buyer QC while the final audit went on. As a result, the QA inspectors were indirectly received the informal training from the buyer QC in the respect of any updated information, and skills related to the quality requirements and methods of inspection. However, the Head of QA raised up her concern involving the needs to impart the technical knowledge to all QA inspectors. She said:

"For your information, my QA team were only expert in measuring garments for the inspection, but they didn't know how to sew the garments. In that case, the sewing supervisor suggested them to learn the sewing process, so that they would be able to understand the potential causes of the defects technically, once they found it."

Although the Head of QA mentioned the above issue that was raised up by the Sewing Supervisor, overall, she was contented with the work performance of her QA team. All the QA staff did not face with any difficulties in recording the inspection data, and they were also understood the buyer requirements, notably in the aspect of AQL. As shown previously in Table 5.11 of Section 5.4.3 (page 150), Company B often found the measurement that out of specification in the sewing department. This situation shows that without the additional skills in sewing, they were capable of conducting the inspection and immediately reporting any problems found to the supervisor for rectification.

Meanwhile, the study shows that the informal training was preferably conducted in all companies (C, D, E and F) that supplied to the domestic market. The learning process occurred but it was not standardised in terms of the procedures, training's contents, and the documents used, including the time and place that were not scheduled in detail before it took places. Furthermore, training was usually given based on the needs of individual rather than a group, resulted from an immediate action from the superiors. Although Company C was ISO-certified, the Head of QC stated that the informal training was preferred because a new QC staff usually was trained and guided once they joined the company or at any time when it was required. It was also found that several companies (D, E and F) relied on the

employee's existing experiences in production, notably to carry out QC tasks. It was understandable these companies recruited skilful workers who had experiences in the garment industry elsewhere to work with them, to help the company to run the production smoothly with a minimum supervision compared dealing with inexperienced workers. Thus, training has become less important activity for quality improvement in the respect of HR. This situation might suggest that garment companies which served local customers, would depend heavily with the existing skills and experiences of the employees rather than strategically plans to improve their competencies for a long-term goal. It differs from the companies who accredited with the international compliance; the management of human resources were more organised as they believed the employee's competencies would be the biggest asset for their garment manufacturing business.

5.4.6 Documentations in QC

One of the core elements in quality assurance, is a development and an adoption of a good documentation system. A documented information in QC activities was essential, whereby it gave evidence on the process control that has been conducted and provided the results or status of the inspection that can be retrieved from time to for the quality improvement. The use of multiple forms and check sheets indicated that the results were recorded and retained based on the processes' requirements. In addition, when the employees are able to conduct the inspection and use the available forms effectively, it shown that the employees were competent in their field, as they gained more experiences from their daily routine jobs and also from the training that was planned for them.

Documentation systems in all case study companies were previously introduced in section 5.3.1e (ISO-certified companies) and 5.3.4b (Non-ISO certified companies). Furthermore, the sections explained the implementation of the systems, by exploring how the employees reacted with the company's requirements, together with any other issues that were emerged during a usage of the documents. This section adds the information related with the use of documentations and records, specifically in the QC department. Therefore, the findings would demonstrate the extent to which the documentation system developed for QAQC had been utilised in the companies with different management systems.

Table 5.14 indicates that ISO-certified companies (Company A, B, C and D) utilised the established documents for QAQC activities frequently, and the records were controlled and retained for the future reference and quality improvement purposes. Despite the availability of QMS documents, it was found that the levels of usage of the documentation systems in QAQC were varied amongst these companies. Company A and C, for instance, demonstrate good examples of an adoption to the documentation system. In Company A, the QMS documents were still maintained and can be retrieved even though the senior management had decided to stop the renewal of the standards. It was found that the QC department still continued to use the registered forms accordingly, to record the inspection results and other related QC processes. Meanwhile in Company C, the Head of QC reported that QC department utilised a high number of forms for all the QC activities compared with other departments. It indicates that when a companies develop and conduct a thorough process control to monitor the quality for its manufacturing, more quality records will be established to provide evidence that the process has been successfully conducted. This was happened in Company C, whereby the process control can be seen in each stage of the manufacturing process (see Figure 5.2, page 112). However, in certain situation, although the company's documentation was existed, issues related with people as a user of the documents cannot be avoided.

Both Company E and F, although they claimed that the quality inspection has been conducted, particularly during the sewing process, the usage of documents for QC activities were very minimum. As been explained in section 5.3.4 (b), the manufacturing operation without an adoption to QMS, predisposed the company to become less organised in terms of the documentation systems. Therefore, this might imply that the compliance to the international standards would guide the company to develop necessary documentations based on their current process approach, including the way to maintain, revise and retain the existing documents.

Table 5.15 Documentations in QC

Documentated Information for QAQC	Companies					
	A	B	C	D	E	F
	Large	Large	Medium	Medium	Small	Small
	Export	Export	Domestic	Domestic	Domestic	Domestic
	ISO-Certified				Non-ISO Certified	
The availability of QMS documents	Yes	Yes	Yes	Yes	No	No
Quality manual	✓	✓	✓	✓	✗	✗
Quality plan	✓	✓	✓	✓	✗	✗
Procedures (SOP)	✓	✓	✓	NA	✗	✗
Process flow charts	✓	✓	✓	NA	✗	✗
Organisation charts	✓	✓	✓	NA	✗	✗
Manufacturing instructions	✓	✓	✓	✓	✗	✗
Measurement specifications	✓	✓	✓	✓	✓	✓
Work instructions	✓	✓	✓	NA	✗	✗
Forms/Checksheets	✓	✓	✓	NA	✓	✓
Frequency of use	Frequently	Frequently	Frequently	Occasionally/ limited use	Do not have standardise documents	Do not have standardise documents

5.4.7 Key Performance Indicator (KPI) for QC

The effectiveness of a company's strategic planning and its achievement can be monitored and evaluated with well-planned quality objectives. Both management and operation units would contribute to the company's performance with a realistic target and goals within the planned intervals. As a result, the current progress and the achievements of all units or departments can be tracked and measured for continual improvement. Therefore, the question related to the Key Performance Indicator (KPI) was asked to the interviewees to understand how each participating company measured the performance of their QC department, either they have established specific KPI's or used different approaches to measure their achievement.

During the sewing operation, although the production department should have their own mechanism to minimise the quality problems or rejection rate, garment's

company still relied with the inspection process to ensure customer's requirements can be fulfilled. Therefore, the QC team was assigned responsibilities and trained to detect non-conformities, whereby the percentage of defects found have been the performance indicator to measure an achievement of the sewing department. It was prevalent situation in the garment industry, when the wage system has been the compelling reasons for the productivity amongst the sewing operators. For that reason, it was quite challenging to ensure the operators to consider each piece of garment's quality for mass-production. Thus, it is paramount for the QC department as a support process in the company, to establish the quality objective or goals. As a result, any error related to the machines, materials, man, and the procedures can be eliminated from the process. In addition, it would indirectly help the company to control an excessive quality variation for all orders from the customers.

Table 5.15 shows the KPI's for QAQC department in each company. It was found that, not all case study companies monitored the QC performance on the regular basis. It is apparent that ISO-certified companies were consistently measured their monthly achievement by establishing the quality objectives or goals compared to non-ISO certified companies. The monthly target was documented, and its achievement was reviewed for improvement with the involvement of senior management. Based on the QMS documentations, KPI's or quality objectives were included in the company's quality manual and subjected to change according to the monthly and yearly achievement with an agreement of the senior management. Furthermore, if the KPI's are not met as planned, the respective department would be responsible to collate evidence, proceed with the root cause analysis, and determine the preventive action to rectify the problem. It can be seen that Company A, B and C (ISO-certified) have implemented both corrective and preventive action for non-conformities found with respect to the company's quality objectives.

Table 5.16 Key Performance Indicators for the QAQC Department

KPI's for QAQC	Companies					
	A	B	C	D	E	F
	Large	Large	Medium	Medium	Small	Small
	Export	Export	Domestic	Domestic	Domestic	Domestic
	ISO-Certified				Non-ISO Certified	
Quality objectives/ Monthly target	Maximum 2.0% defects per month	To minimise complaint of defective products, not more than 10 cases for all products per month.	Sewing defect should be less than 5% per month.	KPI's more towards the production output	No KPI's	No KPI's
It is documented?	Yes	Yes	Yes	NA	NA	NA
Monthly reviewed?	Yes	Yes	Yes	NA	NA	NA
How it is reviewed?	Presented during monthly meeting	Presented during monthly meeting	Presented during monthly meeting	NA	NA	NA
Involvement of senior management	Yes	Yes	Yes	NA	NA	NA

Company D (ISO-certified), since the quality department was not existed, the KPI's were based on the production output targeted for the particular month. According to the Senior Production Manager, the department has established the daily and monthly production target for each order from the customers. Considering they were producing their own brand of school uniform (continuous production) as well, it was extremely important to plan the quantities and a lead time needed to achieve their target and to fulfil the customer's timeframe. The production target was planned based on the Company D's manufacturing resources, and the quantity of garments ordered from each customer. The line chart of monthly production target compared to the total delivery was then presented to the senior management.

On the contrary, Company E and F were not established and documented their KPI's for QC activities. As described from the previous section (see Section 5.3.4b, page 127), since both were small-size and non-ISO certified companies, it was found that the internal processes were managed informally, including the implementation of KPI's. All sewing operators worked based on a daily and monthly production target. According to the Owner of Company F, the production target was set differently for every month based on the order received from the customers. The senior management then would monitor the company's achievement by comparing the monthly production target with the quantity of finished garments contained in the

delivery order (DO). She added that, if the production could not achieve the target quantities as recorded in the DO form, there might be problems occurred during the production stage that need further investigation.

It was understandable from the information provided, Company F established production planning schedules for each customer, instead of the KPIs or quality objectives. Although the monthly production planning existed, including the production for their own brands, there were limited evidence it was monitored and reviewed systematically. This study reveal that ISO-certified companies prompted to measure their achievement with the KPIs, whilst non-ISO certified companies focused to achieve the target that had been set for the production planning. The findings reflect that ISO-certified companies were better in the aspect of process management because the company's ability to measure its monthly achievement and take an appropriate corrective and preventive action for continual improvement compared to non-ISO certified companies.

5.5 Customer Complaint

Poor quality of end products often leads to the customer dissatisfaction. When the customers received the defective items, suppliers or manufacturers would usually be informed about the discrepancies through a verbal and written complaint. As a result, the items should be returned for repair, or any further action would be taken is based upon what have been agreed to between the customer and the manufacturer. However, in the perspective of manufacturer, customer complaint indicated that the customer requirements are not met and therefore, the company's production capabilities can be easily questionable notably if the problems were occurred repeatedly.

In this study, a question about the customer complaints was asked to the interviewees, and the findings were presented in this section because it explained the level of garment's quality produced by the manufacturers, when they have prioritised the process control at all stages of garment production, particularly at the sewing assembly lines. Furthermore, it helps to explain to what extent the methods of inspection used were effective at the companies, when it is logical to assume that the

company should achieve either zero or fewer complaints after the customers received the orders due to the rigorous QC along the production.

The information regarding customer complaints in all participating companies was summarised in Table 5.16. It shows that each company had their own mechanism to respond and solve any issues that were highlighted by the customers, including the department who responsible to manage the complaints. The complaints were varied among the case study companies, as they have adopted different manufacturing resources, production and the management system. Again, for ISO-certified companies (A, B, C and D), the written procedures and related forms were available and more organised compared to non-ISO certified companies (E and F). It was found that the complaints received by the companies who utilised made-to-measure (MTM) production were higher compared to mass-production due to the problem associated with measurement and fit. Although the garments were customised according to the individual customer's body measurement, the quality problems involving several points of measurement still exists. Quality issues pertaining measurement and fit had been explained earlier in Section 5.4.4b (page 195).

Table 5.17 Customer complaint

Customer complaint	Companies					
	A	B	C	D	E	F
	Large	Large	Medium	Medium	Small	Small
	Export	Export	Domestic	Domestic	Domestic	Domestic
	ISO-Certified				Non-ISO Certified	
Frequency of complaint per year	Occasionally	Occasionally	Occasionally	1. Rarely (Mass-production orders) 2. Often (Made-to-	Often	Occasionally
Causes of the problems	1. Material 2. Man 3. Machine	1. Material 2. Man 3. Machine	1. Material 2. Man	Measurement and fit	Measurement and fit	Procedures
Procedures	Available	Available	Available	Available	Available but not documented	Not available
Documents used	1. Complaint detail (email) 2. Corrective Action Plan (CAP)	1. Complaint detail (email) 2. Claim form	1. Complaint detail (written report) 2. Corrective Action Plan (CAP)	Complaint form (not registered)	1. Alteration Log Book 2. Measurement form	Not available
How customer complaint was handled?	The buyer will send the written complaint via email to the merchandiser. Merchandiser will then forward the complaint to the Head of QC for further action. Head of QC to complete the Corrective Action Plan (CAP) form and email it to merchandiser, prior send it to the buyer.	Once complaint received, the sales coordinator will convene a meeting with the appropriate personnel, including the senior management. The complaint then will be investigated (used root cause analysis) with the counter measure to solve the issues. The sales coordinator shall then reply to the customer upon completion and verification of action taken.	Customers will make a phone call or walk in to the outlet or factory. If they come to the factory, they will come along with the defective garments. Marketing personnel will in-charge the complaint and convene a meeting with the appropriate personnel. Corrective action report (CAR) will be prepared once the issue was investigated.	Customers will make a phone call or walk in to the factory before return the defective garments. Once arrived in Company D, production team will inspect the garments for verification and investigate the problem. If the customer caused the problem n they need alteration, they have to pay for it. Otherwise if it is Company D faults, they will repair or alter the garments for free.	The technical team would make a visit to the customer's place/office to verify the problem (if involves high number of complaints) and notes were recorded. After the garments were collected to Company E, the technical team once again will investigate the problem. They will decide either the garments need alteration or new replacement.	Usually, customers will walk-in to the nearby retail outlet and inform the sales assistant about the defects. Sales assistant would replace the garments straightaway if the major defect found. For customers who ordered in large quantities, the production will stop temporarily until the problem can be solved.
Responsibility	Merchandising & QC	Sales & Marketing	Marketing	Production	Technical & Sales	Marketing & Production

According to the Senior Production Manager of Company D, they had received complaints each time MTM orders were proceed in the factory. She asserted:

"Frankly speaking, we do not have any expertise to take our customer's body measurement. Thus, accepting MTM orders for me is worthless."

Considering that the company faced with repeated quality issues when dealing with MTM, she refused to accept orders for MTM, although for small quantities. Moreover, the senior management already made a final decision to discontinue all MTM orders, to maintain a good reputation of their garment manufacturing business with the customers. Therefore, they only focused to manufacture garments according to the standard sizing. In addition, so far, the company experienced with zero complaints when a mass-production system was used.

She added that:

"We seldom receive any complaints for mass-production orders. In the production, let's say we want to manufacture 700 pieces of women's scarf per day, our sewing operators are able to achieve the production target without any complaint from the customers. We have received a positive feedback from the customers. One of them informed that our services are not only quick, but we also can offer them high-quality garments compared to the other competitors."

The statement from the Senior Production Manager shows that the inspection systems (production workers-cum-QC) that were embedded and practised in Company D were considered successful, as long as the MTM production was excluded. They were not only capable of producing high-quality garments for their own brand and as well for different customers, but the company could save money for the cost of quality involving the internal monitoring activities, customer's complaints and returns.

Company E, on the other hand, sharing the same quality problems associated with MTM production (refer to Table 5.15), have experienced almost two decades with the measurement issues. According to the QC Executive, although he was not in the technical team who specifically recorded the customer's body measurement, one of his strategies was to propose a new technique for taking body measurement. This was to reduce the customer dissatisfaction after they received the custom-made uniform or any other outfit. He also mentioned that the problems associated with

MTM would possibly to happen repeatedly after this if there is no co-operation and teamwork spirit between the technical staff and QC to overcome the problem.

Considering the points that were highlighted by the interviewees from both companies D and E, the complaints or issues faced by them were summarised in Table 5.15. The findings indicate that both 'man' and 'methods' were the possible causes which led to the problems. Meanwhile, the action taken by both companies to rectify and stop recurrence of the problem was also provided in Table 5.18.

It was prevalent for the company to plan what can be done to improve the non-conformities with the appropriate corrective and preventive action. Since the alteration for returned garments has been as part of management of the customer complaint, the technical department would be fully responsible to alter the garments as requested by the customers. The garments would not be returned to the sewing assembly line again for rework, because it will interrupt the scheduled daily production for other customers. In this situation, the defective garments will be sent to the technical department for a complete alteration.

Table 5.18 Summary of quality issues for Made-to-Measure (MTM)

Quality issues associated with Made-to-Measure	**Companies**					
	D (ISO-Certified)			**E (Non-ISO Certified)**		
	Medium			**Small**		
Details	Customer dissatisfied with a certain point of measurement, and the finished garments did not fit well to their body, hence led to the alteration or a new replacement of the garments.					
Root causes of the problems	**Man**	✓	<u>Production operators</u> 1. Foreign workers 2. Lack of knowledge and measurement skills. 3. Not familiar with the traditional Malay outfit / made a wrong adjustment for Seam Allowance	**Man**	✓	<u>Technical Staff</u> 1. Less competent and lack of measurement skills. 2. Lack of comminication skills with the customers. 3. Lack of co-operation with QC <u>Customers</u> 1. Fussy customers. 2. Request faster lead time.
	Method	✓	Wrong measurement / Problem in cutting	**Method**	✓	Ineffective measurement's technique
	Machine	✗	Not Applicable	**Machine**	✗	Not Applicable
	Material	✗	Not Applicable	**Material**	✗	Not Applicable
Corrective action	1. Garment's alteration, or 2. New replacement (based on the management approval, usually after a case post-moterm).			1. Garment's alteration, or 2. New replacement (based on the management approval, usually after a case post-mortem)		
Preventive action	to discontinue MTM orders.			1. Introduce and adopt a new method of taking body measurement. 2. Training		

In the respect of other companies (A, B, C and F), the complaints were received occasionally. ISO-certified companies have established procedures to handle and service customer's complaints until the case was completed. Meanwhile for Company A and B that supplied their products abroad, it was compulsory for the appointed buyer QC to decide the level of quality presented by the manufacturers before the garments were shipped to customers. This situation might suggest that the final audit conducted in the manufacturer's site would reduce the possibility of customer complaints. Despite the regular monitoring and inspection activities conducted at all levels of garment production, somehow few defects were discovered by the customers. Therefore, a good management of customer complaints, including the implementation of both corrective and preventive action would sustain the relationships of both suppliers and customers in the apparel supply chains.

5.6 Conclusion

The chapter covers the analysed case study data six garment companies that was purposely selected businesses in Malaysia. All companies represented three types of Malaysian RTW manufacturers which were identified from the findings obtained earlier in the survey questionnaire. Fieldwork with these companies explored how QM practices have been internalised in three different types of manufacturers, focusing on the elements of QM such as the adoption to quality systems, and how they have implemented QA and QC activities in the labour-intensive environment. Multiple case studies methods were utilised to determine the commonalities and differences of QM practices of those companies, as well to further understand the key issues of QM implementation as perceived by the quality practitioners, whom comprised of the senior, medium and low-level management of employees.

The analysis data has shown that the adoption of QM for Malaysian RTW garment industry for both export and domestic market was challenged by several QM issues mainly caused by the human factor. Although manpower has been the important asset for garment production, it was found that human factor is been the biggest barrier to maintaining the effectiveness of QM implementation in the industry. Based on the human factors raised in this study, QM issues was not created by certain

groups of employees, but all employees are potentially contributors to the problem without putting attempts to tackling those issues. Despite having technical knowledge, experience and sewing skills to perform the job, incorrect mentality of workers, poor attitude and their resistance to change can severely retard progress in building a quality culture in the company. This study found that process-based approach QM has been ineffective to control QM issues caused by human factors, and although mature QMS was adopted, the employees were still unable to develop a consistent quality culture. The evidence provided by the interviewees revealed the hidden issues which led to understanding the obstacles to create and sustain a consistent quality in companies that have been extremely driven by control approaches of QM. Moreover, the readiness of this industry to embrace a TQM concept for their long-term business profit is arguable due to limitation of quality improvement activities, since almost all companies were reluctant to utilise advanced quality tools. Furthermore, the ISO 9001 QA system has been perceived less effective QMS for the export market because compliance with the ISO standards is not a priority to international buyers. Therefore, the effectiveness of ISO-based framework for labour-intensive manufacturing companies and specifically to garment industry remains unclear. Nevertheless, for domestic-oriented companies, the awareness to upgrade the management systems to ISO accreditation was seen as a good initiative to control, maintain and improve their internal processes and also as guidelines to internal employees on QM.

According to these key findings, there is need to develop a human-based QA framework which can be adopted in the garment industry that was driven heavily by control system quality management. Next chapter will explicate how a proposed framework was developed based on the critical aspects highlighted in the Malaysian RTW garment industry.

CHAPTER 6

DEVELOPMENT OF HUMAN-FOCUSED QUALITY MANAGEMENT (HFQM) FRAMEWORK FOR MALAYSIAN RTW GARMENT MANUFACTURING SECTOR

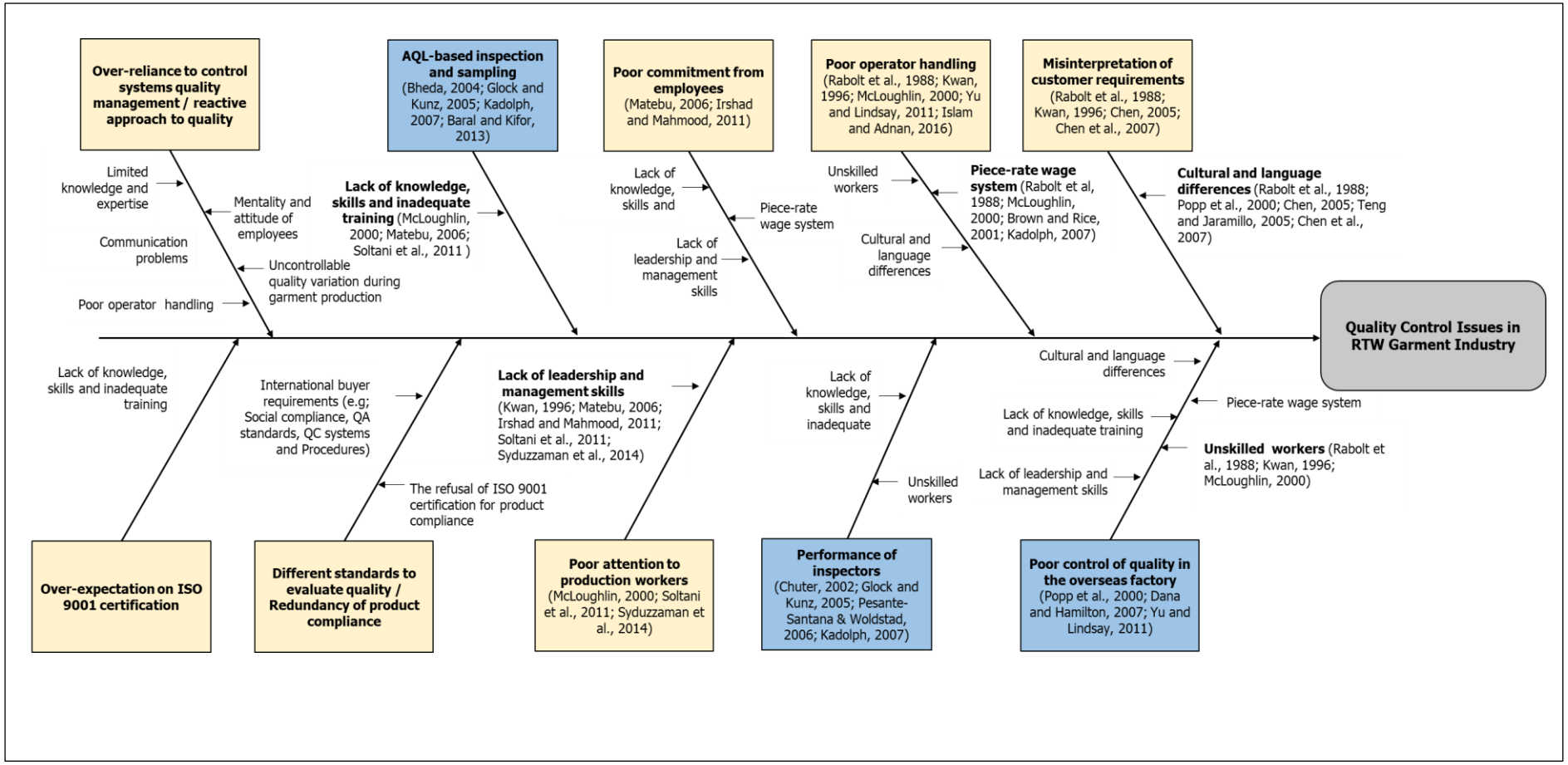
6.0 Introduction

This chapter will critically discuss the key findings analysed from both the online survey and multiple-case study in addressing the final aim of this research. The chapter begins with the key issues that have been the barriers to QM adoption amongst the Malaysian RTW garment manufacturers. The next section outlines and discusses the strategies for incorporating elements of human resources towards developing a Human-Focus QM (HFQM) to facilitate an effective QM implementation. Finally, the last section will explicate the key features to develop a HFQM framework as a new contribution towards a successful journey of performance excellence in a labour-intensive manufacturing environment based on a Malaysian context.

6.1 QM issues affecting the QM practices in Malaysian RTW garment manufacturing

Sustaining the implementation of QM as a system in the labour-intensive organisations has been a critical issue in Malaysian RTW garment industry. Apart from the existing quality problems confronted by the garment manufacturers in other countries which are mainly due to cultural and language differences, the piece-rate wage system and lack of knowledge and skills of the employees, this study confirms those problems also have occurred in Malaysia as one of the RTW garment producers in the Southeast Asia. The current QM issues from existing research and Malaysian case study companies are illustrated using a cause and effect diagram as Figure 6.1. The causes synthesised from a multiple-case study were shaded with gold colour, as several new findings were added to the existing research.

Figure 6.1 Current QM issues from existing research and Malaysian RTW garment industry



According to Figure 6.1, the main factors led to quality problems in the garment industry were caused by human-based issues. This study reveals that, amongst all the causes identified from this study, over-reliance to control systems quality management by both export and domestic-oriented suppliers have been the major obstacles for garment companies to completely achieve an effective implementation of QM. The study found that Malaysian RTW garment manufacturers utilised control systems for QM due to uncontrollable quality variation and to fulfil the customer requirements. Although the multiple-case study presented three different groups of RTW garment suppliers in Malaysia, all the interviewees agreed that they were experienced the same QM issues which associated with human factors. QM issues in three different groups of RTW garment suppliers in Malaysia were summarised in Table 6.1.

Table 6.1 QAQC issues in different category of companies

QC issues: Over-reliance to control systems quality management / reactive approach to quality		**Export-oriented suppliers and quality systems adopters**	**Domestic suppliers and quality systems adopters**	**Domestic suppliers and non-adopters to quality systems**
Causes	**Root causes of the problems**			
Communication barriers	Cultural and language differences	✓	✓	✓
Lack of communication	Unskilled workers	x	x	✓
	Lack of knowledge, skills and inadequate training	x	x	✓
Wrong mentality and attitude of employees	Piece-rate wage system	✓	✓	✓
	Employees resist to change	✓	✓	✓
	Lack of leadership and management skills	✓	✓	✓
Limited knowledge and expertise	Lack of knowledge, skills and inadequate training	✓	✓	✓
Poor operator handling	Cultural and language differences	✓	✓	✓
	Piece-rate wage system	✓	✓	✓
	Unskilled workers	✓	✓	✓
Over-expectation on ISO standards	Lack of knowledge, skills and inadequate training	✓	x	x
Uncontrollable quality variation during garment production	Cultural and language differences	✓	✓	✓
	Piece-rate wage system	✓	✓	✓
	Unskilled workers	✓	✓	✓
	Lack of knowledge, skills and inadequate training	✓	✓	✓
	Lack of leadership and management skills	✓	✓	✓
	Employees resist to change	✓	x	✓
Different standards to evaluate quality	International buyer requirements (e.g; Social compliance, QA standards, QC systems and Procedures)	✓	x	x
	The refusal of ISO 9001 certification for product compliance	✓	x	x

Based on the causes illustrated in Table 6.1, the ultimate challenges in implementing QM in the Malaysian garment industry that adopted control systems quality management and reactive approach to quality are identified as follows:

i) Communication barriers
ii) Wrong mentality and attitude of employees
iii) Poor operator handling
iv) Limited knowledge and expertise
v) Uncontrollable quality variation in garment manufacturing

Additionally, export-oriented suppliers in this study had over-expectation on the implementation of ISO 9001 standards and at the same time they were not comfortable with different standards to evaluate quality of manufactured garments as imposed by their customers. Based on the findings provided in Table 6.1 and Figure 6.2, there are two observed QM issues that have been critical to Malaysian RTW garment industry. The following sections discuss two issues confronted by the manufacturers in maintaining their company's QM.

6.1.1 Poor QM implementation due to human factors

QM and total quality only can be achieved with a strong commitment of all employees to achieve the customer satisfaction (Beatty, 2006; Abdullah, 2007; Ooi et al., 2008). The element of Human Resources (HR) which has been the key to quality and productivity in the manufacturing industries, has received great attention in the QM literature and it contributes to continuous improvement and competitive advantage (Abdullah, 2007; Vouzas, 2007). Therefore, poor QM implementation often associated with the people who implement it. As indicated in Table 6.1, this study confirms that the human factors were critical in all case study companies regardless the size of the companies, market destination, and the QMS they were adopted. The multiple case study evidence shown that these human factors such as: lack of knowledge, skills and inadequate training, cultural and language differences, piece-rate wage system and unskilled workers were important root causes which contributed to the existence of the QM issues in the Malaysian garment industry. Based on these findings, it is argued whether the QM implementation based on ISO 9001 would able to manage people-based issues effectively whereas the

fundamental aspects or core values in implementing QM and total quality are highly contributed by the people employed in the organisation.

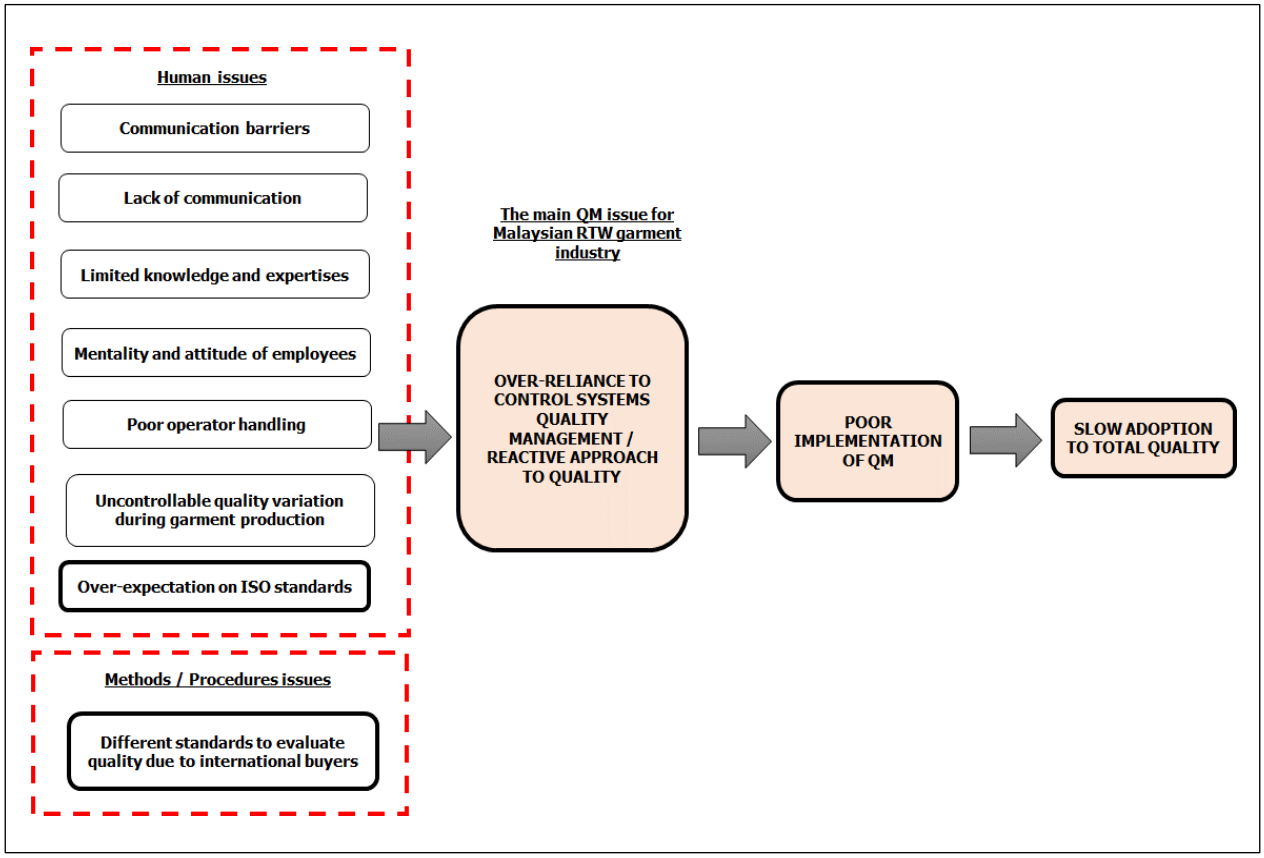
One of the weaknesses in QM implementation is, the garment companies often overlooked the aspect of training and education of their employees. Companies are dependent on the peoples they employed to do a job, hence all employees should be well-trained to perform their job efficiently. This study shows that lack of knowledge, skills and inadequate training led to other QC issues such as; lack of communication between internal and external customers, delay the process of decision making, misconception of quality requirements and inconsistencies of product quality. Interviewees from all case study companies agreed that their company relied to the competence workers among the senior and middle management to initiate the internal training and quality-related programmes. This study shows that competent employees with many years of industrial experiences play vital roles for QM implementation. However, this study also found the old management styles still exist where it was difficult to change both a mentality and attitude of some employees to accept any changes and gain their cooperation for quality. This implies that although the case study companies mentioned a rationale to establish QMS based on ISO 9001 standards was purposefully to build a system for their people, the peoples may view the QMS otherwise. For instance, the employees who work in the production may take time to understand the reasons beyond the adoption of QM practices. In the perspective of production workers, QM practices are viewed as a system to get the processes done correctly to meet the customer requirements, as well for the product compliance, but not a system that can benefit them. They could hardly tolerate to decelerate the activities in production or doing additional work for the sake of quality due to a monetary issue. Of these difference view of QM implementation, this study suggests that the employees fall into the trap of thinking, which led them to build a wrong perception of quality at the workplace.

In respect of cultural and language differences, the influx of foreign workers from other neighbouring countries such as Indonesia, Myanmar, Vietnam, Bangladesh and Nepal, who have migrated to Malaysia have made majority of RTW garment manufacturers employed the foreign workers. Apart from lower production cost, they were employed because of their technical knowledge, experiences and skills in

sewing operations. However, the reliance to the foreign workers as low-level employees created other QM issues which can limit the smoothness of QM journey in the garment companies. For instance, lack of communication and communication barriers led to misunderstanding and misinterpretation of the customer requirements, as well the instruction and information provided by the senior and middle management. Therefore, the communication barriers involving a cultural and language differences between the production workers and the management side should be solved wisely to ensure the effective communication.

Figure 6.2 illustrates how the QM issues found in this study have led to poor implementation of ISO based quality systems, hence resulted in slow adoption in building a TQM-based organisation. Therefore, minimising the problems which are uncontrollable can be done by strategizing the preventive measures in a long-term perspective to prevent the problems to become a burden to the company.

Figure 6.2 Human-based issues led to slow adoption to total quality



6.1.2 The survival of ISO 9001 as the company's QMS in Malaysian garment industry

Despite of series of revision, the shortcomings of ISO 9001 still been discussed in the literature. As depicted in Table 6.1, there were new findings added to the literature which included the perception of senior management towards the accreditation of ISO 9001 standards such as: over-expectation on ISO standards and the compliance to different standards imposed by the international buyers. These QC issues have been found pertinent to be discovered, yet the discussion on these highlighted issues was found limited in the current literature.

In respect of assuring quality for manufactured garments, ISO 9001 have been the most well-known QMS among the RTW garment manufacturers in Malaysia. This study indicates that the certification-oriented approaches (e.g. ISO 9001 and WRAP) were preferable compared to non-certification oriented approaches (e.g. TQM, Six Sigma) amongst garment companies. In addition, all ISO-certified garment companies have less interest to utilise the advanced concept of QM for their manufacturing processes. This study found that the ISO-certified garment companies have been lacking qualified employees to initiate quality activities and to maintain the adoption of the QMS.

The section below discusses the survival of ISO certified manufacturers who supplied to the international and domestic market and highlights the future of this international standards to the Malaysian RTW garment industry.

a) ISO-based implementation system for export-oriented suppliers

This study found the following issues were affecting the QM implementation while maintaining the ISO 9001 requirements. The issues are:

i) Over-expectation on ISO accreditation
ii) Different customer's quality standards to evaluate quality

Based on dilemma experienced by the export-oriented suppliers who had been certified with ISO 9001 standards, this study implies that, the manufacturers are not able to customise their own QMS according to the company's need based on the guidelines and the requirements of ISO 9001. This study therefore indicates

Malaysian RTW garment industry has given much focus to the processes rather than on the human aspects. QM implementation based on QC and QA approach to quality was mentioned by Voucas (2007) as process-oriented and not targeting to enhance and value the internal customers. When the training and self-development are given priorities, this would help the employees to develop their competencies and guide others in various quality initiatives. Hence, in the case of ISO 9001 certification, if the companies extremely need a QMS or QA system, they would be able to customise their own QMS while fulfilling to the ISO compliance. However, if the certification was pursued only for the marketing strategies to penetrate a global market, the QM implementation based on ISO 9001 can be a burden to the company in the respect of financial and the involvement of all employees once the compliance to the standards are not required by the customers.

It was clear that export-oriented suppliers adopted ISO standards to gain customer acceptance in the global supply chain. Thus, the ISO certification was viewed as a ticket to penetrate the global market. Meanwhile, the market pressure from other local manufacturers in different industries influenced the senior management of garment companies to adopt the ISO 9001 to be at par with other successful local manufacturers. This 'peer-pressure' was seen as an influencer to make the senior management realised the importance of embedding QM into the manufacturing processes, otherwise they will be left behind compared to their competitors. However, different quality standards imposed by the international buyers predisposed the manufacturers to conduct different QA and QC evaluation to monitor the quality of export garments, which was found redundant with the compliance of ISO standards. The issues experienced by the companies involved in the export market shown that the adoption of ISO standards is difficult to maintain if different quality standards need attention at the same time. Furthermore, the decision of senior management of both company's A and B not to proceed with a renewal of the ISO compliance shown a sign of frustration resulted from 'over-expectation on the ISO standards'. In response to the customer requirements, this study indicates that WRAP and BSCI compliance were preferable and much useful for them compared to ISO 9001. Therefore, the effectiveness of ISO 9001 QA Systems for Malaysian export-oriented manufacturers can be argued and the failure to understand these issues would lead to the difficulties in adopting the ISO-based framework for

strengthening the QA systems for RTW garment manufacturers. This case study raised an argument on the future of ISO 9001 standards for export-oriented RTW garment manufacturers in Malaysia because it implies ISO 9001 has been not well-implemented for improving company's performance and continuous improvements (Purishothama, 2010).

b) ISO-based implementation system for domestic-oriented suppliers

In contrast, based on the feedback of senior management who represented the ISO certified companies who supplies RTW garments locally (C and D), they were found comfortable with ISO 9001 compliance and would continually to get themselves prepared for periodical assessment from a third party. This study shows that manufacturers who supplied locally were adopted ISO 9001 to build their own QMS and to create a culture of continuous improvement amongst their people. According to the General Manager of Company C, ISO 9001 certification is not only a key business concept for their market survival, but also act as an approach to engage people in quality. He mentioned the annual surveillance audit by the third party which was scheduled every year would be a driver to continuous improvement activities as they need to provide evidence that such activities are visible in the system. Therefore, this study implies that ISO 9001 would continually gaining acceptance by the local garment manufacturers to accomplish organisational commitment to quality. However, in reviewing the implementation of ISO 9001 amongst the domestic-oriented suppliers, again, the human issues were mentioned as the main obstacle to successful implementation of QM.

In relation to overcome those QC issues, this study highlights that a merely focus to a process approach through a compliance of ISO 9001 standard was not enough to build and sustain the quality-focused culture in the RTW garment manufacturing industry which known as extremely labour intensive. Therefore, this study suggests that there is a need to develop a human-focus based QM framework to naturally foster the engagement and participation of all employees for quality. Developing and adopting a system which give much attention to empower human as a quality person by inculcating human values in their daily routine work would be suitable for textiles and RTW garment industry rather than quality systems that focusing solely to meet the customer requirements. The next sections will discuss how a Human-Focus

Quality Management (HFQM) would be developed and proposed to strengthen a QM implementation in the Malaysia's RTW garment industry.

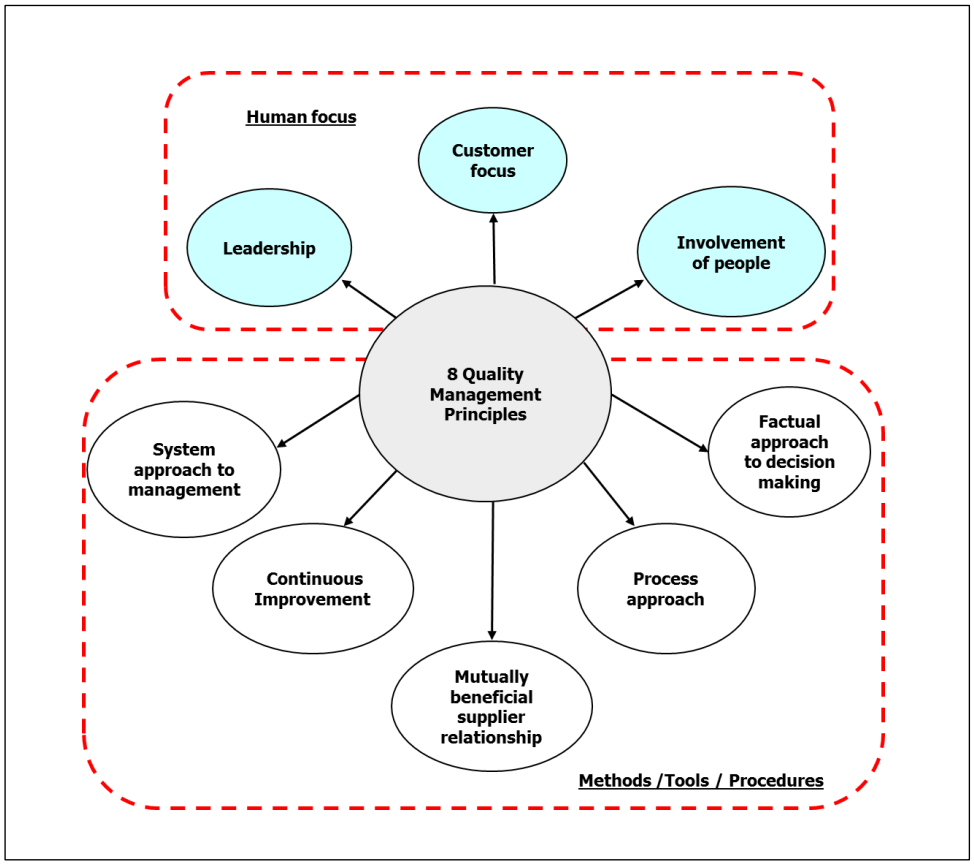
6.2 The strategies towards developing a Human-Focused Quality Management (HFQM) for Malaysia's RTW garment industry

This study confirms that both large and medium size of Malaysian garment companies have developed their QMS based on ISO 9001 standards. However, this study found that although ISO-certified companies were struggling to achieve the compliance to ISO requirements, the QM developments were stagnant in the stage of QC and QA due to over-reliance to control systems QM. Based on these scenarios and the popularity of ISO 9001 certification amongst Malaysian manufacturing industries, this study utilised the ISO 9001 QM principles to strategise a suitable QM framework for Malaysian RTW garment industry. Theoretically, the stage of QA can be achieved with the implementation of ISO 9001 standards and other international standards developed to suit the specific industries such as QS 9000, ISO/TS 16949, ISO22000 and HACCP (Jaccard, 2013). According to ISO-based framework, there are eight important principles designed as an approach for successful implementation of QM in any organisation (Purushothama, 2010). Out of eight principles; leadership, customer focus and involvement of people are principles that emphasises on human, whilst the remaining five principles were grouped together to indicate the varieties of methods, tools or procedures to implement the ISO standards (see Figure 6.3).

Based on an illustration of Figure 6.3, this study adopted three principles of QM that highlights the roles and contribution of peoples prior to successful QM implementation. Considering the feedback from interviewees on how QM was perceived, the garment industry need a QM that able to control and manage all employees to implement quality. It is believed that a new development of QM framework driven by 'quality people' which incorporate the elements of leadership, customer focus and involvement of people could be fundamental changes to the way QM is perceived in the garment industry. Thus, it is important for the textile and garment industry to develop and sustain the nature of quality through a suitable quality framework that give priorities to the management and utilisation of people as valuable assets in the manufacturing sector. Furthermore, managing people

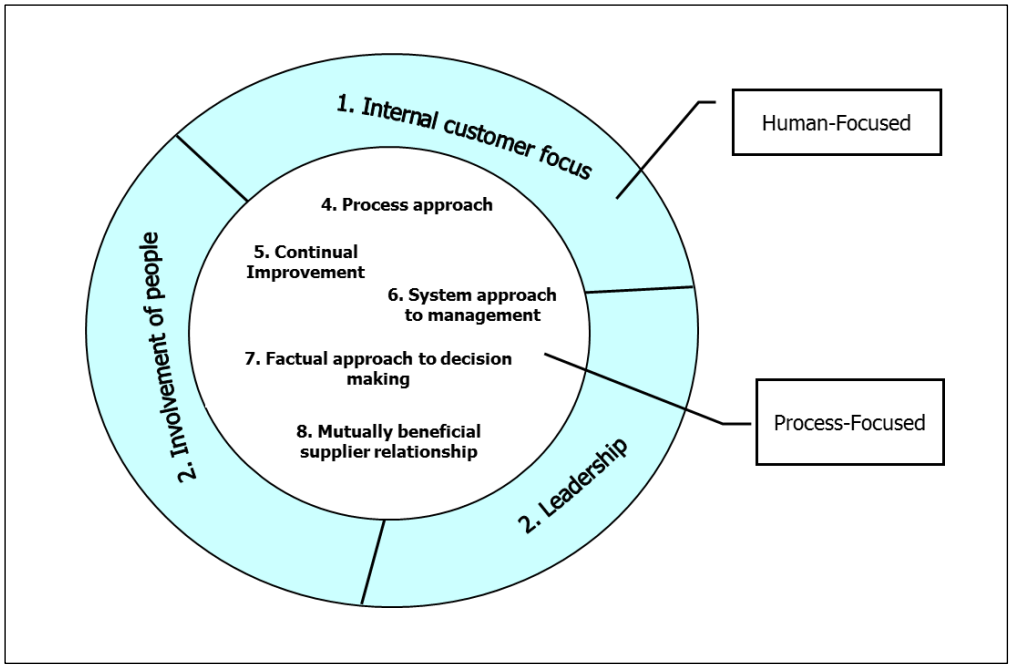
effectively is the key factor to embrace a consistent implementation of QM in today's global and competitive business environment (Rahman and Tannock, 2005, Khalid et al., 2011)

Figure 6.3 QM principles prior to adoption of ISO 9001



Although the ISO 9001 have outlined eight QM principles to navigate organisations in accomplishing their QM implementation, it might be difficult to attain all the guiding principles simultaneously. This study therefore suggests that focusing on the elements of human in the respect of leadership, customer focus and involvement of people are the key principles prior to implementing the remaining five principles that are prone to process-focused rather than human. This is summarised in Figure 6.4. When the productivity and performance of all level employees are optimised in the respect of customer focus, leadership and people's engagement, it would indirectly help organisation to execute other QM principles which are process-focused more convincingly. Organisations should strategise the suitable methods to enhance the performance of all employees at all levels to improve their existing QM.

Figure 6.4 QM principles fragmented to human and process-focused



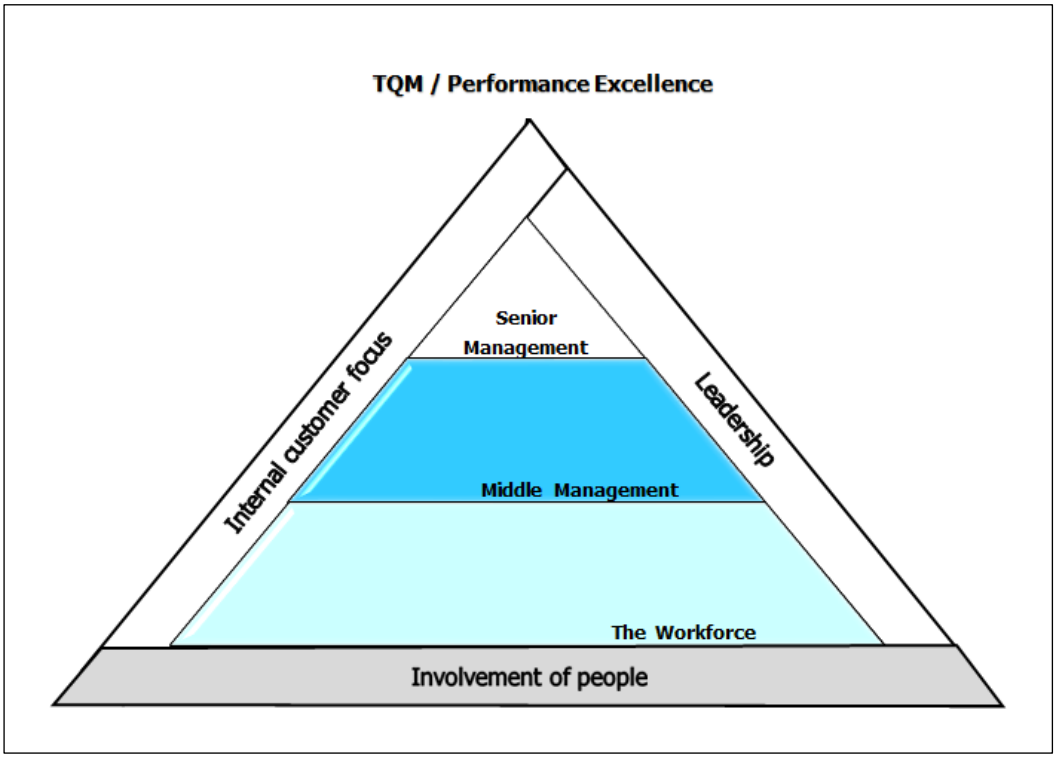
The following sections will explain three principles of QM that would be the main factors or pillars of this new QM framework focusing on the element of people. These three principles are of fundamental importance to build a nature of quality in the labour-intensive companies prior to any compliance to the international standards.

6.2.1 Involvement of People

Element of Human Resources (HR) is paramount to all manufacturing industries. However, the road to successful TQM or performance excellence can be a difficult journey without a greater sense of togetherness amongst people in the organisation. Individual's commitment to quality which requires participation from all level employees is integral towards attaining an effective QM implementation. Garment factories, although employed many production workers mainly for the sewing operations, they still need a balance contribution of all level employees irrespective of their present position, income level and the section or departments they worked with. Therefore, ensuring quality of garments couldn't be limited to a departmental and individual's job. In fact, all level of employees has their own roles and responsibilities to build a quality-focused culture in the organisation.

Each level of employees has different job scope, power and roles to help the companies to achieve the organisational vision and mission. Upper and middle management usually interchangeably lead processes, involves in a strategic quality planning and decision making, whereas the workforce executes the quality plan accordingly and they are directly involved at different stages of garment manufacturing. Figure 6.5 illustrates a human-focus quality triangle to assist a reader to understand how the roles of all level employees interrelates with human-focused QM principles. This quality triangle was designed to indicate the importance of human-focus QM principles to pursue quality as a system in the organisation. According to Figure 6.5, the involvement of people is placed at a bottom part of the quality triangle as a foundation of any QMS planned to be deployed by the organisations. It indicates that QM can be effectively implemented, if only all level of employees is able to commit and engage with quality activities either individually or as a team. The employees should be valued through these QM principles; internal customer focus and self-directed leadership. These two principles become a pillar of the triangle because it could foster the involvement of people for continual improvement.

Figure 6.5 Human-focus quality triangle



Although each level of employees carries on distinct roles in their working routine, their involvement in any quality activities may lead to the organisational change for a better workplace. This study identifies four factors to foster employee's engagement to sustain the quality-focused culture in RTW garment manufacturing companies which are: senior management commitment, an effective communication, and competence employees as well clear and measurable Key Performance Indicator (KPI). Each factor is discussed in the following section.

a) Senior Management (SM) Commitment

Senior management plays significant roles in determining the direction of the companies based on the organisation's charter and objectives. They are competent and experienced employees who have power in giving authorisation, initiate strategic quality planning for both short and long-term goal and involved in decision making process. Additionally, SM also is responsible to effectively communicate the quality objectives to the middle management and the workforce to ensure a mutual understanding of all level employees.

Based on the observation made to all ISO-certified companies, SM have shown their full commitment and supported all quality programmes implemented. The study found that all interviewees amongst the SM were able to demonstrate their understanding on the ISO 9001 certification. Additionally, they were able to justify the reasons they pursued and adopted the ISO 9001. For example, the interview results with the General Manager of Company C shown that the company aware of the compliance of ISO 9001. The internal and external audit were planned and conducted as scheduled and it was perceived as important agenda for company's quality improvement. According to him, the company will continue adopting the ISO 9001 for the benefits of the company. He highlighted that:

"Honestly, ISO 9001 to my understanding is a quality system that help organisation to produce end products as according to the agreed requirements. However, unexpected things might happen while the manufacturing process take place. Thus, by complying with ISO standards, we are aware of several possible risks, and at least we have already developed a written guideline to cope with the problems."

In the case of Company D, the Human Resources Manager interviewed was considered as a mastermind and she was personally involved in establishing the documentation systems for the company. Understanding her roles towards the ISO 9001 accreditation, she believed that the QA systems based on ISO 9001 standards can be one of the approach taken by the company to guide the people to do the right things and to ensure everybody to follow and uses the same SOP to produce consistent results. Additionally, the commitment of SM to inculcate quality to all employees can be seen using company's slogan and it was being displayed in the management office and the manufacturing sections. For example, Company C used the slogan *kualiti lahir dari rasa kasih which* means quality can be achieved if everybody in the company loves their jobs. As a result, they would inherently feel responsible to produce the desired products requested by the customers and not simply ignoring the quality, just to increase a daily production output.

This study indicates the commitment given by SM is critical towards quality and it has a strong influence to attract other employees to engage with all quality agenda that was strategically planned. This can be attained by understanding their roles and contribution to the company, and to follow and implement the right approaches to achieve it.

b) Effective communication

Consistent with the literature as highlighted in Figure 6.1, this study found that an effective communication is the very essence of improving QM amongst people in the organisation. This study shows that communication problem not only occurred in a company that employed foreign workers, but it also happened in a company that employed local peoples to perform a job. The study confirms that communication barriers and lack of communication were problems that can cause undelivered information which lead to misinterpretation of the customer requirements.

This study found that majority of Malaysian RTW garment manufacturers (except Company C) relied on the foreign workers for garment manufacturing process. The foreign workers were mainly from the developing economies in the South-East Asia who speak different languages and have limitations to use English for daily conversation. Among all companies, Company D portrayed interesting examples of

practices which can contribute to the effective communication in a company that employed foreign workers. As they mainly employed workers from India, it was surprised to discover that a few number of Malaysian Malay senior and middle management employees were able to communicate with the workers by using Hindi language fluently. Interestingly, most of the senior management staff (Malaysian) able to speak Hindi just by mixing with the workers and having a daily conversation with the production workers. This situation benefited the workers in receiving instructions from their supervisors or head of department when they would hardly understand either English or Malay language. Furthermore, the management gained respects from the workers because of their willingness to learn and speak their language. It was observed during a fieldwork, the Senior Production Manager of Company D gained much cooperation from the workers, since she was able to communicate with the production workers using Hindi language. Hence this situation helped her to verbally disseminate any information directly to the workers and received feedback immediately from the workers.

Further, Head of QA of Company C who was Filipino shared her view regarding the use of language for communication. She said:

"I've used English to communicate with all employees, but the problem is, most of the production operators mainly in the sewing line are not understand English. So, if I got to tell them anything, I will ask the production supervisor's assistance to convey the information to the operators on behalf of me. In a long run, personally, I would like to learn Malay language so that I will be able to communicate with them easily."

Another example provided by Company A was found useful to manage the communication amongst the foreign workers. According to Admin Manager of Company A, Malay and English were spoken languages between the production workers and the management sides. The assistance was asked from a group of senior workers (with almost 10 years of working experiences) to assist the communication process of new workers and to act as a mediator between new workers and the SM.

Meanwhile, talking about poor communication, QC Executive of Company E highlighted that lack of communication as one of a critical problem associated with measurements and cutting process in made-to-measure (MTM) production system. He stated:

"The technical team member's especially new employees who responsible to take the measurement did not appropriately communicate with the customers. They should develop a technique to gain information from each customer by asking several questions related with clothing's fit and comfort. This can be considered as advantage to us because we have a chance to ask them individually and at the same time we also speak the same language."

Although several researches have explored the communication issues as barriers to effective QM implementation in the countries where all the managers and employees used the same language and shared a similar cultural background, as happened in China (Popp et al., 2000; Chen, 2005; Chen et al., 2007), this research however represented the opposite scenario. This study provided evidence on how the communication process between Malaysian senior and middle management with foreign production workers who utilised different languages and cultural background can be improved and sustained for an effective QM implementation. This study indicates that the willingness to learn other languages would help the process of daily communication between the management side and the production workers. This situation therefore leads to achieve an effective communication amongst peoples in the labour-intensive manufacturing companies because the production workers develop a sense of respect and trust to both senior and middle management due to their ability to use different language. On the other hand, according to the feedback from Company E, internal training related to the technical knowledge's and skills required to perform a job would be the best method to increase an effective communication in the company that employed local workers. On-the-job training is suitable and more practical to be conducted in the manufacturing environment, whereas they can immediately apply the knowledge and skills taught to perform a specific job within the workplace.

c) Competence employee to lead quality

Competence employees are very important resources to any organisation. Their expertise are resulted from many years of experiences, together with the skills and knowledge in the working field they involved with. This study found that the competence employees in quality can initiate the company's quality agenda, and they were able to conduct series of internal training to other employees. Additionally, they also used their past experiences to contribute ideas and suggestions in improving the company's key processes.

This research reveals that non-ISO certified companies relied to the competence employees to manage and improve the processes. It was observed in both Company E and F; lacking competence manpower could be the main reason they were lagged behind ISO certified companies in the stage of QM implementation. Additionally, the interview results with the HR Manager of Company E revealed that his past working experiences in other companies help him to identify the area of improvement, make appropriate suggestions and bring the matter to discussion during a monthly management meeting. Further, Company E also relied on the technical knowledge and expertise of their experienced QC Executive to monitor quality of garments during production.

On the other hand, this study also found the presence of competence employee to lead the QA systems in ISO certified companies have strengthen the quality team in performing series of inspection as required by the customers. For instance, the Head of QC of Company A stated that she conducted several internal trainings to re-fresh the knowledge and skills of the QC inspector and will make an assessment from time to time to measure an individual performance. She also ensures the important information related to the customer requirements and quality inspection procedures are correctly displayed at the department's notice board, hence her quality team could be notified and get reminded of that particular information. The printed materials displayed were included few coloured photographs of different types of garment and packing defects, as well a monthly or yearly achievement of the department. The same scenario can be found in all ISO certified companies; thus, it indicates the importance and the role of competence employees to increase people's engagement in QM implementation.

d) Clear and measurable departmental Key Performance Indicator (KPI)

The company is organised as a system which comprised of multiple key and support processes. According to the ISO requirements, each key and support process should be measured and analysed in order to determine its effectiveness (Purushothama, 2010). Therefore, the process owner should develop a clear and measurable KPI, so that a monthly or yearly performance of each process could be tracked and

monitored, while unachievable KPI will be investigated further for quality improvement. Without it, all employees can lose focus. The evidence from ISO certified companies show that either KPI or quality objective was established and documented. This study found that a clear and communicable KPI could drive the production workers, including the QC inspectors to meet the target set by the companies and indirectly would increase the productivity of the workers and minimise quality problems.

6.2.2 Self-directed leadership

Leadership is another important principle to support QM implementation. This principle was highlighted as critical success factors in many organisations (Abdullah, 2007; Qiu, 2009; Rocha-Lona et al., 2013). Although the leadership skills often associated with the role of managers as a leader, this study highlighted that all level of employees can develop and optimise their individual potential and become more self-directed through the concept of empowerment, motivation and appreciation. The following section will discuss the observed factors from this study which can contribute to organisational success in relation with self-directed leadership.

a) Empowerment, Motivation and Appreciation

Empowerment is a concept to value people in a sense of assigning someone a responsibility and giving power to them to make appropriate decision to satisfy customers (Evans, 2014). Adapting this concept in the labour-intensive companies means the management put a high level of trust to the employees, notably to the low-level to involve in the decision-making process. The benefit of empowerment is to make everyone has accountability, carry out the process with an integrity, react to any changes and take immediate action to avoid either minor or major disturbance to the next process.

Although leadership is often related with the roles of managers or senior management, this research found that the production workers should also possess leadership skills in building a quality-focused culture in the organisation. The workforce should be trained as well as a leader and this practice make them realise they are able to make a huge contribution even working as sewing operators in providing the best quality of the brand they are producing in the market. This study

shows that, there are possibilities to Malaysian garment industry to survive without recruiting quality inspectors for mass production of RTW apparel. Although other case study companies established their own quality department with the assistance of several quality inspectors, the case presented by Company D was in opposite. According to HR Manager of Company D, all sewing operators were trained to self-check the garments they sewn and take necessary action if there is something wrong with the stitching, materials as well the sewing machines they are using.

She stated:

"While the sewing process takes place, each operator will also act as a QC. All of them got the measurement tape, so they will measure themselves according to the size of the garment and inspect by their own before pass the finished goods to the supervisor. That is how we train and teach them here."

It was observed that, the SM was successfully empowering the low-level employees which lead to improvements in quality and productivity. Further, as pointed by Senior Production Manager of Company D, she said that since the company did not have a quality department for quality inspection, the production supervisor was responsible to monitor the workmanship of sewing operators instead of in-line QC inspectors. It was observed that, without a presence of in-line inspectors in the sewing assembly line, sewing operators able to give full concentration to their work since the movement of peoples in the sewing line to pass the defective garments for repairs can be minimised.

The Company D's Senior Production Manager added that all sewing operators never made a complaint when they were assigned with responsibilities to check the material they handled before and after they sew the garments. In fact, they already get used with it. For example, she mentioned that most of the production workers would not straight away proceed with the current operation without checking the bundles or materials they just received.

She highlighted the following situation:

"Our production workers will automatically check the garment first once they received the materials before any specific operation begins. Sometimes during a self-check, they're able to detect both minor and major defects which come from the preceding operations. Prior to this situation, the supervisor or manager of that particular

department will get notified of any quality issues found and take an appropriate action before it's getting too late."

The owner of Company F also highlighted how the company educate and train the employees to be responsible for whatever mistakes they have made. Managing a small garment companies that being operated less than two years made she realised her responsibility to advise the production workers to avoid being selfish, yet they must act immediately if they find out any nonconformities during the production. According to her, the production workers need to be reminded repeatedly. She also stated that:

"Representing a senior management in this company, my husband and me realised that sometimes we do make mistakes at certain situations. But we have learnt many lessons from it and therefore we also want the workers to do the same thing. They must admit their own mistakes, learn from it and do not repeat the same mistakes twice. My husband always come in to the factory usually in the evening when the sewing operators need to work over time, just want to make sure the operators produce garments correctly. By doing this, the sewing operators become more careful in handling the garments because the big boss will observe their performance."

This research confirms that one of the factor which can lead to employee motivation and appreciation is through the empowerment. Although it seems like the management assigned an additional works to the employees, the concept of empowerment changed the mindset of a middle and low-level employees when they are feel appreciated and valued because the SM trust their capabilities to in-charge and lead a process. Empowerment also can motivate employees to perform better in their daily routine job.

Significantly, this study discovered that when SM empower, motivate and appreciate all level of employees, it will indirectly embed human values to inculcate a positive mindset and attitudes amongst employees. Therefore, with the presence of self-directed leadership and related skills among lower-level of employees, they would inherently avoid making mistakes and help others to improve qualities. The culture and action of blaming other people's when something go wrong should be changed with a positive and healthy working environment which could revives the teamwork spirit for organisational success. This situation lead people to involve in quality not because they have to, but because they want to.

6.2.3 Internal Customer Focus

This research confirms that Malaysian RTW garment industry are extremely customer-driven in adapting with any changes related with QM implementation. It was understood from the interview results, ISO certified companies pursued international quality standards certification due to the current market competition and to gain confidence from the customers. Although ISO 9001 standards identified customer focus as one of principle towards effective QM implementation, the scope of customers are generally directed to satisfy the external customer. This study therefore highlights the importance to gain employee's satisfaction by focusing on the internal customers who are involved directly in both key and support processes.

In relation with a development of HFQM framework, focusing to the internal customers is an important principle to foster the employee's involvement in quality. Based on the human-focus quality triangle depicted in Figure 6.7, both internal customer focus and leadership skills, as the pillars of quality triangle could propel everyone to get involved in the quality improvement. Focusing to the internal customers mean the SM identifies the elements which can satisfy their employees and motivate them to boost their performance. As a result, satisfied employees would lead to better working performance, and this can be translated with reduced customer complaint and non-conformities found in the manufacturing process.

The following section will discuss the observed factors which can enhance the focus to the internal customers in developing the HFQM framework.

a) Employee training

Employee training is considered utmost important quality improvement programmes in all companies with established QMS. It is impossible to achieve required level of competencies of an individual employee without continual training and education. All level of employees can make themselves valuable to the company and upgrading their knowledge and skills by committing to both internal and external training. All employees are the asset of the organisation, therefore the senior management should optimise both middle and low-level employee's job performance and productivity by supporting them to acquire new knowledge and skills through training. Employee training helps them in learning as well. This is the strategy for the

organisation to use the employees more efficiently as part of their future investment for the benefit of the organisation (McLoughlin, 2000).

As mentioned in Section 5.4.5 of Chapter 5, this study indicates that lack of knowledge, skills and inadequate training were the problems faced by the Malaysian garment industry on the QM implementation. Lack of training often leads to poor performance of employees and poor involvement in quality processes. This study found that all companies conducted employee training but the level of how it was planned and implemented varies. Internal training was preferred and usually carried out informally due to the nature of manufacturing that require an immediate action and solution. For instance, according to Company C's Head of QC, all new production workers will be trained by the department's supervisor before they were assigned to do their job.

In aligning with QM implementation, Company A as an export-oriented supplier, demonstrated good practices in training and make a full use of the competency of its human resources. As a WRAP certified company with established documentation systems resulted from the adoption of ISO 9001, Company A has standardised procedures to achieve the employee's competencies. According to Company's A Head of QC, she was responsible to train new recruited QC inspectors in all aspects of quality inspection, particularly on the knowledge's and skills that the inspectors need to know for QC. Working in the company that supplied RTW garments abroad with strict requirements imposed by the buyers, she realised the competency of her QC team would assist the company to determine the types of products which did not meet the customer specifications. Understanding her roles within the department and vast experiences in the garment industry, she was stating:

"We need to train the new workers how to write and record the inspection data. Besides, they should be trained to recognise all different types of defects. That's why if you noticed here in the QC room, I have printed and displayed the examples of various defects, which might be found in the production on the notice board. Therefore, the printed defect's images will help them to familiarise with it, detect the problem, report and write the right defect's name in the inspection forms."

Additionally, it was found that small garment companies (non-ISO certified) were not actively engaged with training compared to large and medium-sized companies due to limitation of their human resources. The learning process occurred indirectly

during the production processes which resulted slight improvements for the quality of RTW garments. Based on the feedback of all case study companies, this study confirms that the role of competence employees, particularly amongst the senior and middle management as explained earlier in Section 6.2.1c is very important for employee training in the Malaysian RTW garment manufacturing sector. The focus given to the aspect of employee training for peoples working in the garment industry surely would help the company to attain its quality objectives and to improve the QC issues which became the barrier to QM implementation.

b) Reward and recognition

There are other strategies should be initiated by the senior management as part of internal customer focus, which is reward and recognition to the production workers. Despite of empowering and motivating them by realising the individual workers have a potential to become a leader, a reward and recognition would make them feel valued and appreciated. Once an individual worker is rewarded and given a recognition, it will influence others to work accurately so that they also can have a chance to receive the same rewards.

Based on all case studies, Company A offers an increment of salary to the production workers who exhibit excellent performance based on their periodical employee assessment. According to Head of QC of Company A, she was required by HR department to do an assessment in every three months to all quality inspectors worked in the QC department to determine their competencies level.

c) Effective wage scheme

This study found that piece-rate wage scheme has been ineffective to be applied in the Malaysian garment industry. Most of the case study companies who had using the piece-rate wage scheme few years ago, had decided to change to a basic monthly pay to minimise quality problems associated with a piece-rate wage system. This study indicates that although the productivity increased because the workers tend to work rapidly to gain more monthly pay, the experiences from the interviewees revealed that this scenario led to high numbers of defective garments. They were driven by money rather than quality for daily production. Further, the sewing operators unwilling to cooperate with QC personnel to solve the quality issues. It was

shown that the use of piece-rate wage scheme made the sewing operators to become individualistic and selfish rather than having a teamwork spirit to prevent poor quality of garments.

Interestingly, the interviewees from both Company A and D mentioned that there are few workers amongst hundreds of sewing operators employed in the production, who can work very fast and at the same time they were able to produce high quality garments. This small number of sewing operators have earned the highest pay every month. Therefore, based on this situation, Senior Production Manager of Company D personally preferred a piece-rate wage scheme compared to basic salary because they were able to meet the lead time allotted. Additionally, according to Head of QC in Company A, after considering the pro and cons of both salary schemes for the sewing operator, the management decided to use basic salary for new style of garments ordered by the customers, while the salary based on piece-rate will be used for continuous batch of garments. Based on those examples, this research shows that the effective wage schemes should be customised and introduced to the production workers, for instance what was offered in Company A suggests that the management made a 'win-win' decision. In this situation, sewing operators still can earn more monthly pay with minimal defects.

6.3 A Development of HFQM framework as a New Contribution for Malaysia's RTW garment industry towards Successful Journey of Performance Excellence in a Labour-Intensive Manufacturing Environment

One of the key contributions sought in this research was to develop a new QM framework which is potentially to be adopted by Malaysian RTW garment manufacturing industry for a successful QM implementation. This section addressed the final aims of this study which is to develop a QM framework for an effective QM implementation in Malaysian RTW garment industry as a new contribution towards successful journey of quality excellence in a labour-intensive manufacturing environment. Using a mixed-method approach to investigate the phenomenon, a major contribution from multiple-case study derived from six Malaysian companies were translated to a development of Human-Focused Quality Management (HFQM) framework based on the evidence that the 'human-based issues' were the main obstacles to achieve total quality, thus have made the RTW garment industry was

currently lags behind in QM implementation compared to other Malaysian manufacturing industries such as in automotive, electrical and electronic.

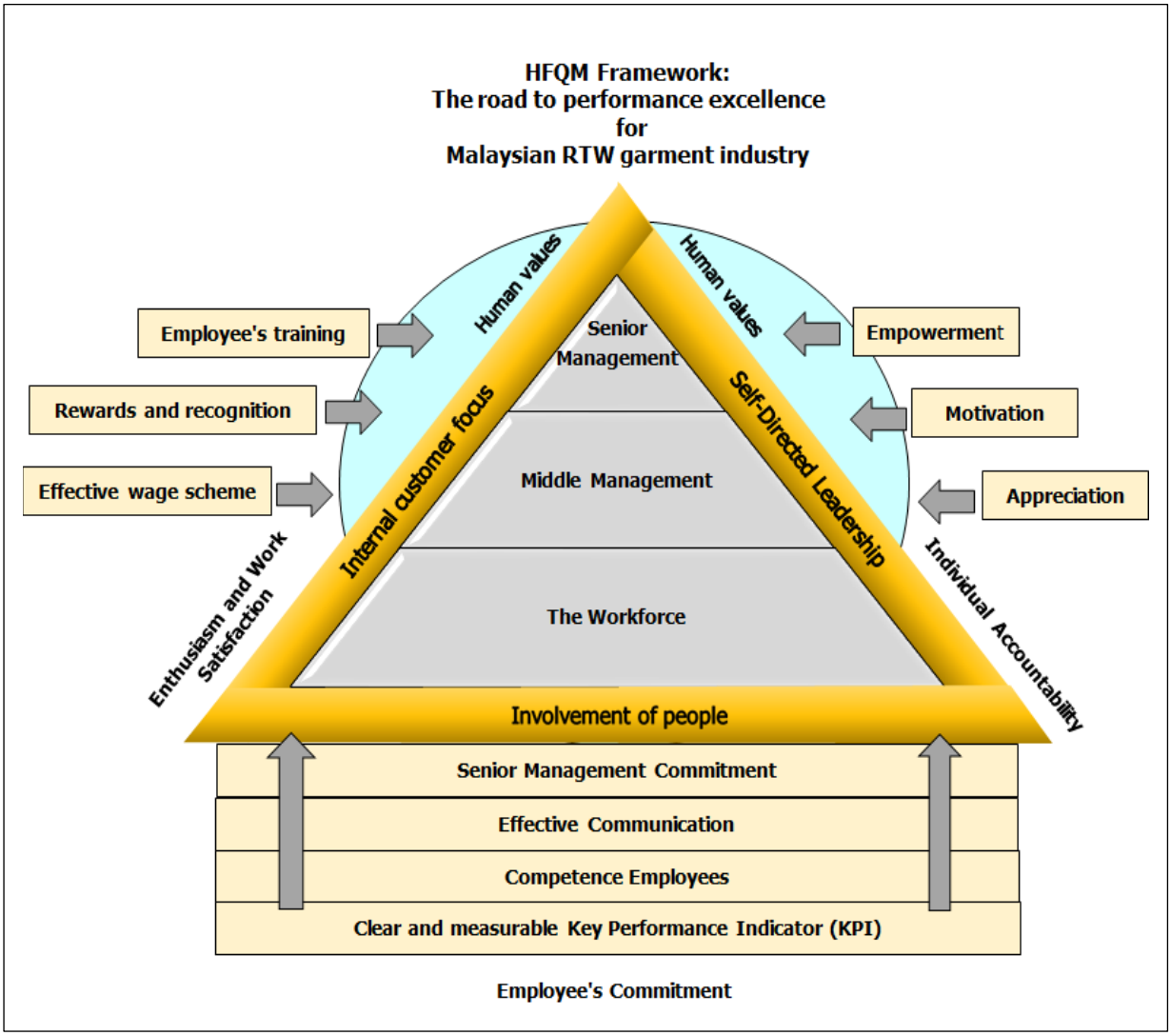
This new proposed QM framework is illustrated in Figure 6.6. It was conceptualised from ISO 9001 QM principles since the ISO 9001 certification is the most common international standards amongst Malaysian manufacturing companies (Ahmad and Yusof, 2010; Ab Wahid, 2012; Sidin and Wafa, 2014). The issues highlighted by case study companies regarding the ISO-based implementation system indicated that RTW garment industry who are also the overseas contractor for the international buyers had difficulties to maintain the compliance to ISO 9001 requirements, although they were committed to pursue the ISO registration at the beginning of their QM journey. This study implies that the international buyers are not likely to be influenced by ISO 9001 compliance and the ISO registration is not an important criterion for the export-oriented Malaysian garment manufacturers to get the business contract from the overseas buyers. According to this scenario, a whole-hearted QM implementation based on ISO 9001 was difficult to achieve and sustain. Therefore, considering the human-based issues were critical in RTW garment industry, there is a need to develop a QM framework that specifically focus on the aspect of human rather than the process-oriented approach.

It was understood from a management literature that even though QM implementation can be achieved by complying to ISO 9001 requirements, ISO 9000 standards are developed as generic management system standards, which can be applied in any industries, regardless the products and services it provides (Beatty, 2006; Jaccard, 2013). However, due to this reason manufacturers found it difficult to adopt the ISO 9001 as a minimum requirement for QMS implementation according to their business needs. Based on this limitation, QM should be defined based on the context and circumstance of the industries itself as the different model or framework developed would produce dissimilar outcomes of implementation (Iwaarden et al., 2006; Mosadeghrad, 2013; Eriksson, 2016). Therefore, considering the findings from the literature, as well the significant results from this study, a HFQM framework for Malaysian RTW garment industry was developed and proposed (see Figure 6.6).

Based on the multiple case studies, a formulation to achieve human-focused QM principles were identified. The framework was developed based on human-focused

QM principles (see Figure 6.4) that was embedded onto the hierarchy of people in the organisation as a quality triangle (see Figure 6.5). The framework shows the strategies towards achieving an effective QM implementation which can lead to the performance excellence for Malaysian RTW garment industry as explained in Section 6.2 of this chapter.

Figure 6.6 Proposed HFQM framework for Malaysian RTW garment industry



According to Figure 6.7, the ultimate focus to develop a HFQM framework was based on three human-focused QM principles which are: involvement of people, self-directed leadership and internal customer focus. Each of the human-focused QM principles used in the development of this QM framework are reviewed as follows:

6.3.1 Involvement of people (individual employees)

Involvement of people is a key to performance excellence. This has been highlighted by many authors in the literature, whereby all employees need to engage with all the quality initiatives which lead to high performance organisations (Beatty, 2006; Poksinska et al., 2006; Oke and Owaba, 2007; Qiu, 2009; Kemenade, 2014). The study found the factors such as the commitment from senior management, a proficiency in multi-languages to improve a daily communication, competent employees in QM implementation as well a clear, and measurable KPI can inspire people to get involved and contribute to quality. This study confirms that the QM implementation can be effective to the organisations when all level of employees understands their roles and responsibilities, and voluntarily participate in any QI activities to achieve both company's short and long-term goal. Further, this study indicates QM should be viewed as a system of people due to people-based issues highlighted instead of merely a process approach. Therefore, commitment from all level employees are important because the involvement without a commitment from individual employees would not results desired outcomes. Based on this HFQM framework, the focus on both principles: self-directed leadership and internal customer focus are suggested to foster people engagement in quality.

6.3.2 Self-directed leadership

Self-directed leadership is one of the pillar that supports the human-focused quality triangle, but it should be initiated and strategically planned by the senior management to create a culture of accountability amongst the middle management and production workers. Significantly, this research discovered that all individual employees have a potential to be trained as a leader, including the production workers through the concept of empowerment, motivation and appreciation. In today's business environment that has been exposed with many unexpected possibilities, production workers should be educated to make a quick and accurate decision. This will indirectly educate them to act promptly regarding any quality issues since any delay in decision making would increases the cost of quality. This study emphasis on the leadership skills amongst the middle and low-level employees, instead of only targeting to the senior management (Chowdhury et al., 2007; Rogala, 2016). The key benefits of self-directed leadership are all employees

can become more accountable whilst performing their job by avoiding any mistake. This study therefore implies that the emphasis of self-directed leadership amongst the production workers would help the manufacturers not to be dependent too much on the control systems quality management or reactive approach to quality to produce high-quality garments to the customers.

6.3.3 Internal customer focus

Another pillar that supports the human-focused quality triangle is an internal customer focus. The study indicates that there are three factors to enhance the internal customers which are continuous trainings, rewards and recognition, as well an effective wage scheme. This HFQM framework highlights the importance to give much attention to the internal customers because their dissatisfaction would result to poor performance and low productivities. They also might be reluctant to involve and commit with quality because of lack of interest and do not see their contribution are important to the company. Therefore, this study believes that the senior management should give attention to the internal customer satisfaction to ensure the smoothness implementation of QM in the garment industry as the peoples employed are the backbone of the organisation.

Further, a circle behind the triangle shows all human-focused QM principles should be supported by the element of human values such as knowledge, respect, responsible, honesty, loyalty, happiness and piece. The presence of human values in the framework would shape a mindset and attitude of individual employees on how they perceive and adopt quality as their lifestyle prior to accomplishing a performance excellence.

6.3.4 HFQM framework – Core elements for successful implementation

Based on the human-focused QM principles that were used to develop the HFQM framework, this study suggests that QM implementation in Malaysian RTW garment industry can be achieved and sustained with the presence of the following circumstances:

a) Commitment

Commitment has no need of rules. It is anticipated that when all employees are willing to engage and commit to quality, a QMS can be implemented effectively because the teamwork spirit among staff in an organisation would make the process of continual improvement easier to be accomplished and monitored. QM implementation needs both involvement and commitment from the managers to low-level employees, otherwise a journey to embrace TQM will remain unclear. Therefore, a full commitment and involvement of people can be developed with accountability, enthusiasm and job satisfaction.

b) Accountability

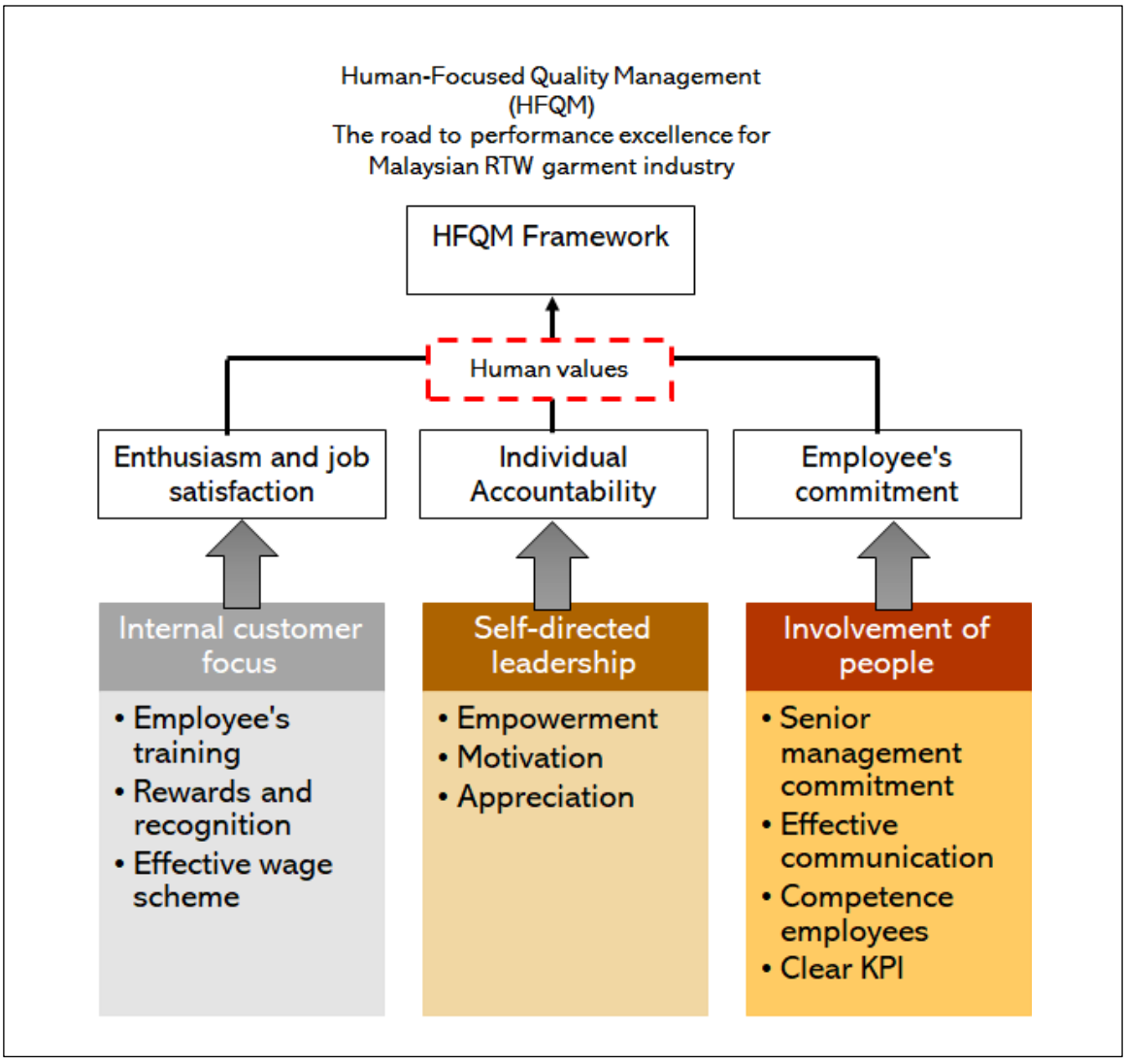
Personal accountability at all levels of employment should become a day-to-day activity to inculcate good values within members of staff. According to the HFQM framework, accountability can be attained with empowerment, motivation and appreciation. When senior management empower employees at all levels, they will become more self-directed. The concept of empowerment is important to educate workers on leadership skills and to shape up positive mindset amongst them when dealing with others; which will enhance quality. This study recommends that apart from the role of the managers to practice leadership skills, each production worker should be trained as a leader to grow within their sphere of personal accountability. When all employees become more accountable, they would take responsibility to perform their duties seriously and be able to work successfully as a team to fulfil the company's quality goals. The teamwork spirit would discourage a culture of pointing fingers of blame at others of wrongdoing and promote collective efforts.

c) Enthusiasm and job satisfaction

Employees training, rewards and recognition, as well as an effective wage scheme would create both enthusiasm and job satisfaction amongst the employees. Again, it is part of senior management duties to create a positive environment within the workplace to build up employees' enthusiasm and satisfaction in completing their daily tasks. Thus, the enthusiasm and satisfaction would lead to full commitment to QM implementation and result in achieving positive outcomes from adoption to any QMS in the organisation.

With the presence of core elements explained as above, the HFQM framework diagram depicted earlier in Figure 6.6 was therefore revised to Figure 6.7. This framework is applicable to all levels of employees in the organisation. Figure 6.7 provides a more clearer flow of human-focused elements which theoretically leads to successful QM in the garment industry.

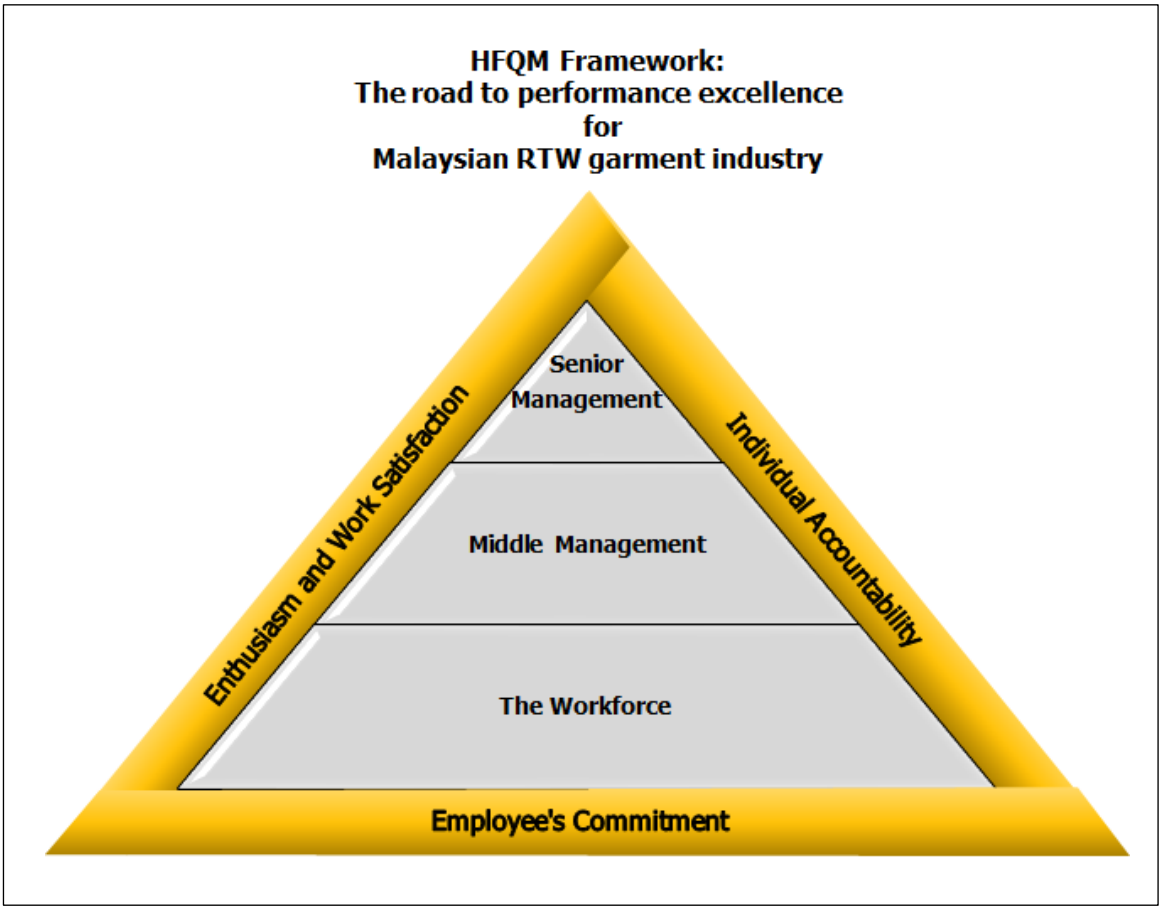
Figure 6.7 HFQM framework



According to Figure 6.7, HFQM can be achieved by focusing on internal customers, educating employees to be more self-directed and getting all employees to be involved in QM activities. The strategies to attain those three elements have been based on critical cases within the Malaysian RTW industry and may be adopted in other labour-intensive manufacturing companies. Successful achievement towards QM activities would lead to employee enthusiasm, job satisfaction, accountability and

both individual and collective commitment towards the provision of quality. When all employees within an organisation possess these elements towards delivery of quality within their organisation, as well as aspects of human values that shape their mindset and attitude, successful application of the HFQM framework would be accomplished. A simplified version of the HFQM framework is presented as Figure 6.8. This is also laser-focused and leads to an excellence performance route for the RTW garment industry, specifically in Malaysia.

Figure 6.8 Simplified version of HFQM framework



6.3.5 Implementation plan for HFQM framework for the Malaysian RTW garment industry

Based on the current QM issues and the outlined strategies to help the Malaysian RTW garment industry to develop a quality-focused culture in their organisation, a HFQM framework that focus on the human elements for an effective QM

implementation has been developed. In theory, although a company's QMS or QA system can be systematically implemented with ISO 9001 certification, this study however, found that implementation of the ISO-based quality system that is mainly process-oriented can be ineffective for the RTW industry if it mainly relied on and adhered to prescribed stages of QC and QA for QM. Moreover, as the specified human factors identified by this study have been found to be critical for Malaysian garment industry, the study suggests that a new QM framework which is more suitable to the Malaysian context should be developed and proposed to strengthen the QM implementation. Additionally, this study offers solutions on the strategies to sustain a QM implementation within labour-intensive manufacturing companies.

The study HFQM's framework has not been established to replace the ISO 9001 or other international compliance standards for a company's QMS, but this QM framework has been critically developed towards fundamental improvement of a company's RTW garment manufacturing system for the benefit of the garment industry. This study further recommends that garment manufacturers should give much focus to the element of human resources at all levels within their organisations prior to pursuing international quality standards, because they are responsible to use, maintain and improve the systems. Globally, many manufacturers have suffered to maintain a consistent QMS due to lack of fundamental preparation prior to acquiring the international standard certification (Khalid et al., 2011; Majumdar and Manohar, 2016). To mitigate these, the HFQM framework stands to guide garment manufacturers on how to manage and implement an effective QM system.

As employees in an organisation are key towards organisational change, the HFQM framework would minimise barriers to the adoption of total quality within the industry that have hitherto heavily utilised control systems and reactive approaches to quality. A conceivable implementation plan for this framework is as follows:

i) The HFQM framework must be viewed as a system focussed on people. It can be introduced as a new management system in the company. The activities that reflect elements in the framework should be incorporated in the company's strategic planning for organisational change. This implementation plan needs commitment from senior management.

ii) If the company has already adopted a QMS, the HFQM framework could be used together with the existing quality system/s. HFQM could be customised according to the need of organisations and all elements in HFQM could be embedded in the company's existing Standard of Procedures (SOP). All departments should be informed clearly about this framework. This may be carried out during a management meeting through brainstorming and detailed discussions focussed on how to translate HFQM framework to the actual practice within the company. Manufacturers should establish departmental procedures that is more human-focused as opposed to process-oriented.

iii) Key Performance Indicators (KPI) of each department should show evidence of elements of HFQM. KPI should be analysed and presented to the department.

iv) Senior management should visit production floors more often and interact with production workers so that the workers would feel at ease to share any QM issues with them.

v) Employee's training needs should be identified; and competent and skilled employees should train others in handling the manufacturing process.

vi) Rewards and recognition for good performance should be given to those who are eligible, in order to motivate others for quality and productivity improvement.

vii) At the stage of implementation, senior management should use employee satisfaction surveys to evaluate the effectiveness of this framework.

Application of the proposed HFQM framework stands to render several benefits to the textile and RTW garment industry in Malaysia. In addition to the implementation plan outlined, Table 6.2 provides suggestions of the QM implementation based on the HFQM framework for three types of Malaysian RTW garment suppliers.

6.4 Chapter Summary

This chapter has brought up the QAQC issues based on the current research, including what has been found in the Malaysian context. These key findings confirm that the QAQC issues confronted by the Malaysian RTW garment manufacturers were caused by over-reliance to control system quality management. Additionally, the human factors were critical, hence it hindered the adoption of TQM in the

garment industry. Therefore, this study develops a HFQM framework in response to the human issues highlighted in all case study companies as a new contribution for Malaysian RTW garment manufacturing industry. The framework could also be proposed to labour-intensive manufacturing companies in other developing economies.

Table 6.2 Implementation plan for the HFQM framework

HFQM FRAMEWORK FOR MALAYSIAN RTW GARMENT INDUSTRY					
Category of Malaysian garment manufacturers	**Current stage of QM**	**Possible implementation of HFQM Framework**	**Suggestion of QM implementation**		
			HFQM	**HFQM & ISO 9001**	**HFQM & social compliance**
Export-oriented suppliers and quality systems adopters (Large companies)	Quality Assurance (QA)	i)The utilisation and management of human resources can be based on the HFQM framework as a proposed solution of people-based issues in garment manufacturing.	x	✓	✓
		ii) HFQM framework can be adopted together with the international standards compliance to enhance the elements of people in the organisation towards achieving the performance excellence.			
		iii) HFQM framework can be adopted if the garment companies refused to renew the ISO 9001 certificates due to different quality standards imposed by the international buyers. Export-oriented suppliers would continue their QM implementation based on this framework together with other social compliance according to the customer requirements.			
Domestic suppliers and quality systems adopters (Medium-sized companies)	Quality Assurance (QA)	i)The utilisation and management of human resources can be based on the HFQM framework as a proposed solution of people-based issues in garment manufacturing.	x	✓	x
		ii) HFQM framework can helps the local manufacturers to sustain the QM implementation based on ISO 9001 requirements to stay competitive in the Malaysia's market.			
		iii) HFQM framework can helps the local manufacturers to revisit their QA systems by not heavily dependent on control systems to monitor quality of garments. This can be achieved when peoples are empowered, with training and skills development.			
Domestic suppliers and non-adopters to quality systems (Small companies)	Quality Control (QC)	i)The utilisation and management of human resources can be based on the HFQM framework as a proposed solution of people-based issues in garment manufacturing.	✓	✓	x
		ii) HFQM framework help the local manufacturers to establish the company's QM without a registration to ISO 9001.			
		iii) HFQM framework is of fundamental importance to small companies prior upgrading their QM from the stage of QC to QA system.			

CHAPTER 7

CONCLUSIONS

7.0 Introduction

This final chapter summarises the key findings from the preceding chapters in fulfilling the aims of the research which expands the current body of knowledge in the field of QM based on the evidence of QM implementation in Malaysian RTW garment manufacturing industry. Section 7.2 presents the key summaries and conclusions of this research as according to each aim developed for this study. Section 7.3 highlights the contribution of research to the field of study in the respect of theoretical contribution to QM prior to a development of HFQM framework of quality for RTW garment industry. Finally, this chapter also outline a recommendation for future research in Section 7.4.

7.1 Key Summary and Conclusions

The journey of QM for garment manufacturing industries globally are full of challenges and unpredictable changes due to the demand of the markets, manufacturing complexities and short product life cycle (Iwaarden et al., 2006; Yu and Lindsay, 2011). The current literature has provided evidence on poor execution of QM in the developing economies, hence led to unclear position of TQM in the garment manufacturing industry. Thus, this research explored the issue of QM implementation in the Malaysian context. Malaysian textile and garment industry is one of the industrial sector that continually contributes to the country's economy based on a potential growth and export, as well with an increasing number of local entrepreneurs who have ventured into garment manufacturing business (MKMA, 2006; MIDA, 2017). The significance and value of conducting this study contributes to the survival of this industry in generating wealth to sustain the country's economy and to understand how QM has been internalised by the local manufacturers with the presence of quality-related issues for QM implementation. Malaysia case studies highlighted in this research were differed compared to other developing countries

such as in Pakistan, China and Bangladesh because the industry heavily utilised foreign workers for the manufacturing process. To date, a research that exploring a QM implementation amongst Malaysian RTW garment manufacturers has not yet been carried out. The absence of a suitable QM framework which can fit and adopted in the garment industry, indicates an urgent need for the development of a new or revised framework for understanding and improving the organisation. Therefore, this research can initiate other serves as an impetus for driving forward future research involving Malaysian textile and RTW garment industry in TQM and performance excellence.

Overall, a well-planned methodological approach for data collection and analysis was successfully carried out to achieve all the research aims. The key conclusions are presented in the following section based on each of research's aim that was achieved.

7.1.1 QM practices of Malaysian RTW garment manufacturers

Chapter 4 of this thesis addressed the first research aim concerning QM practices of Malaysian RTW garment manufacturing for the domestic and export market. Data was synthesised and documented from the findings of questionnaire survey. The purpose of the questionnaire survey was to determine the level of QM implementation in the manufacturers with respect to the QA systems and QC activities based on the feedback from 31 garment companies across all regions in Malaysia. This study found that the certification-oriented approaches (e.g. ISO 9001) are preferable compared to non-certification oriented approaches (e.g. TQM, Six Sigma). Garment inspection was central, and the advanced concept of QM was perceived as less useful for their manufacturing process. This study confirms that a reactive approach to QM was preferred compared to the proactive approach, as the companies did not fully operate in TQM mode. Thus, the findings have led to questions on the readiness of this industry to adopt the latest QM concept for manufacturing, since the control systems quality management such as QC activities and inspection were utilised heavily in each stage of RTW garment production. It was found that Malaysian garment manufacturers perceived QM implementation as challenging even though they are ISO-certified companies due to human factors. It was noted from the literature that human factors are the common issues associated

with labour-intensive manufacturing companies, where poor performance and slow productivity resulted in a negative impact to the garment industry. This study also confirms that there are hidden issues that have hindered QM implementation, which need further investigation. Despite that, performance of Malaysia as one of the RTW apparel suppliers in the Southeast Asian Region has been affirmed. The findings led to comparative analysis between Malaysia and other developing countries in the aspect of successful QM implementation. Furthermore, the first aim identified the stage of QM implementation among Malaysia manufacturers, which help the industry to improve and establish mission and vision to sustain in the industry.

7.1.2 The internalisation of QM in Malaysian RTW garment industry and factors inhibiting the production of TQM products.

Six case study companies which represented three categories of Malaysian garment manufacturers were purposefully chosen for in-depth investigation on how the QM implementation was carried out based on the size of the companies, company's QMS, and market destination. The multiple-case studies were conducted to gain feedback of people in the garment industry on QM implementation and the quality-related issues that became a barrier for them to sustain the quality system.

The internalisation of QM in Malaysian RTW garment industry was answered in Chapter 5 and Chapter 6. At this phase of data analysis, each company provided evidence on how it utilised QM to control the people, processes and conducted continual improvement activities. The study found that the export-oriented and ISO-certified suppliers were having difficulties to maintain the compliance to ISO 9001 due to different standards for quality evaluation imposed by the international buyers. On the other hand, domestic-oriented suppliers lacked competent quality personnel to lead the QM implementation. Moreover, the continual improvement activities were dependent on the initiative of competent employees, while there was a limitation in providing continuous training and skills development to the employees. As discussed in Section 5.4 of Chapter 5, this study therefore confirms that the over-reliance to control systems quality management still occurs even in companies that have been ISO 9001 certified. Moreover, human factors were critical in the Malaysian garment industry, as elaborated in Section 5.3.1 (a, b, c) and Section 5.4.4. Based on the current QM issues which indicate the weaknesses of QM implementation in the

garment industry located in developing countries, this study suggested a development of HFQM framework which is more suitable for Malaysian RTW garment industry with labour-intensive environment as an achievement of the second aim.

7.1.3 Contribution of Human-Focused Quality Management (HFQM) framework development towards the Malaysian RTW garment manufacturing sector

A Human-Focused Quality Management (HFQM) framework has been proposed by this study and presented in Figure 6.7 of Chapter 6, as a key guideline for the Malaysian RTW garment industry to be implemented prior to application of QMS when adopting a TQM for quality excellence. Section 6.3 of Chapter 6 further discussed how this framework can be adopted by the manufacturers and an implementation plan was outlined and summarised in Table 6.2. This research developed the HFQM based on the element of human resources that should be given priorities with the human values embedded within people in organisations. The main ideas to conceptualise this new QM framework was derived from the ISO 9001 QM principles. Out of eight QM principles, three of them were found to be related to human factors, namely; internal customer focus, leadership and involvement of people. Based on these three QM principles, the strategies behind developing a HFQM were determined from the success stories of Malaysian case study companies. These companies were classified into three categories of RTW garment suppliers; (i) export-oriented suppliers and quality systems adopters, (ii) domestic-oriented suppliers and (iii) quality systems adopters, domestic-oriented suppliers and non-adopters to quality systems. The study found that the garment industry required a different QM framework to build and sustain a quality-focused culture among employees in the manufacturing business sector. As human issues were found to be critical for today's QM implementation, the HFQM framework was developed based on the roles and people management in companies, to ensure that any quality system implemented works well and is fit for the purpose. The notion of total quality and performance excellence of the framework can only be built and sustained if relevant employees understand their roles and responsibility, as well as become willing to voluntarily apply prescribed quality procedures.

The outcome of this research is not only useful for the Malaysian textiles and RTW garment industry, but also has the potential to be applied in other developing countries where the industry supports the economic growth; particularly in other Southeast Asia countries such as Thailand, Indonesia, Vietnam, Cambodia and Bangladesh. This study is also relevant to the future of ISO-based QM implementation amongst export-oriented suppliers in Malaysia.

7.2 Contributions to New Knowledge

The key findings of this research lead to following contributions to the field of study as follows:

7.2.1 Contribution to QM literature

As much of the previous literature has focussed on non-textiles SMEs manufacturing industries and large organisations (Rahman and Tannock, 2005; Zadry and Yusof, 2006; Deros et al., 2008; Abdullah, 2010; Anuar and Yusuff, 2011), this study served as the pioneer research in Malaysia that highlighted on the actual QM implementation in RTW garment manufacturing industry. Moreover, there were limitations of discussion in existing QM model and framework that could help the garment industry to develop and maintain their QM implementation. The key findings have led to the understanding on several QC issues that represented Malaysia as one of the ASEAN countries in the developing economies. It was reported by Rahman and Tannock (2005), the QM literature amongst the ASEAN countries are still scarce, thus this study has been successfully developed a QM theory related to the garment industry of Malaysia. Furthermore, this study confirms the human factors are the major barriers that led to ineffective implementation of QM. This research also demonstrates the importance of developing a new QM framework that can fit the RTW garment industry that has been known for its complexities in manufacturing processes (Iwaarden et al., 2006; Vorokolu and Park-Poaps, 2008) Thus, a development of HFQM framework that was tailored to the need of Malaysian garment industry could initiate the organizational changes which requires all level of employees to deliver the best qualities as the human values were embedded to the framework. Therefore, with the presence of HFQM framework, the industry which comprised of domestic and export-oriented suppliers would be able to sustain as a

contributor to the Malaysia economic growth towards achieving vision 2020 as targeted by the Malaysian government (Malaysia Economic Planning Unit, 2015).

Numerous research on ISO 9001 implementation have been conducted across the globe, and yet the shortcomings still exist which lead to the opportunities for expansion of knowledge (Oke and Charles-Owaba, 2007; Eriksson, 2016). This study draws some important lessons in understanding and improving the value creation resulted from QAQC issues which have hindered the TQM implementation in the Malaysian context. This study has brought a new perspective of ISO-based QM, generally in the labour-intensive manufacturing companies. This framework highlights the importance of commitment of all employees, rather than process-oriented that was found ineffective for the garment industry. It highlights the future of ISO 9001 QA systems based on Malaysian case studies. The study implies a proposed HFQM framework would be a fundamental criterion to be adopted by Malaysian RTW garment manufacturers prior to the adoption to the international QMS towards successful journey of quality excellence in a labour-intensive manufacturing environment.

7.2.2 Contribution to the theory

Although the theory of QM has evolved few decades ago, the current research on ISO quality systems theory still found shortcomings due to misconception of its implementation. The misconceptions are existing due to poor understanding of theoretical basis of QM implementation. The HFQM framework presented in this research would help the garment manufacturers to understand and utilises the key principles of ISO 9001 effectively, rather than only concentrating to conform to the standards for product compliance. This study found that one of the area which need improvement is lack of understanding of eight principles of QM along with compliance of the ISO 9001. Additionally, this HFQM framework can be incorporated to the company's QMS as preventive measures to sustain a quality-focused culture for a long-term quality accomplishment.

7.2.3 Contribution of Research Design and Methodology

This study has determined that within the Malaysian context, the critical realism (CR) approach provides more clear and in-depth understanding of the research problems in addressing the aims of this research. In this study, CR philosophy was adopted as researcher's philosophical system, thus it helped to determine the most suitable research design prior to data collection and analysis. It is believed that a combination of multiple measures and observations has provided a sufficient data and information since everyone in the organisation might provide dissimilar views on the subjects being researched based on their cultures, experiences and knowledge (Trochim, 2006; McEvoy and Richards, 2006). Thus, it helped to develop in-depth explanation and understanding towards the phenomenon.

The chosen research philosophy and methodology are therefore unique in this field of study since this study adopted mixed methods research design to synthesis and document a QM implementation in Malaysia. While other studies mainly used a single research approach, either quantitative (QUAN) or qualitative (QUAL) for data collection and analysis (Fatima and Ahmed, 2005; Chen at al., 2007; Qiu, 2009, Soltani et al., 2011) this study chosen an Explanatory Sequential Mixed Method (ESMM) research design to address all research aims and questions. The selection of ESMM improved a triangulation of data because of two-phase of data collection and analysis of both QUAN and QUAL whereas it can provide a more complete understanding of a research problem than a single approach alone.

7.3 Future research

The following points for future research can be recommended for further investigation in this topic:

i) The scope of this research is primarily applicable to Malaysian RTW garment manufacturers. Future research could expand further investigations of by comparing the QM issues to other developing countries that employed peoples who able to speak the same language at all level of management.

ii) Future research could be extended to the Malaysian textiles industry which able to assist in developing and documenting a database of QM status and

implementation of Malaysian textile and RTW garment industry. This is importance for the future of QM development and improvement of the Malaysian textiles and apparel industry to compete globally against established RTW garment producers in Asia.

iii) Future research should focus on the theory validation of this new proposed framework to evaluate the extent to which this framework can be effectively adopted by peoples in the garment industry.

iv) In the respect of ISO-based QM, the inputs were obtained only from the garment manufacturers that currently are ISO 9001 certified companies. More fundamentally, future study is needed to gain a deeper understanding of complying to the quality standards using non-ISO based quality systems from the perspective of international and local customers' requirements. Therefore, a comparison of these QMS can be analysed prior to understand the real phenomenon in QM implementation.

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APPENDICES

APPENDIX 1: Confirmation letter as a postgraduate research student

Student and Academic Services

Faculty and Campus Student and Academic Services

Date: 25 June 2014

Manchester Metropolitan University

Hollings Faculty
Righton Building
Manchester
M15 6BG
United Kingdom

Telephone
+44(0)161-247 2489

E-mail
e.goncharova@mmu.ac.uk

To whom it may concern:

Re: Nor Juliana Mohd Yusof

With this letter I confirm that Nor Juliana Binti Mohd Yusof, date of birth 16/10/1981, student ID number 13160441, is enrolled on MPhil/PhD programme of study at Hollings faculty Manchester Metropolitan University.

The title of Mrs Mohd Yusof thesis is `*AQL-based sampling for garment inspection in Malaysian garment manufacturing: a quality control framework*`.

Please do not hesitate to contact me if you require further clarification.

Yours sincerely,

Mrs Aly Goncharova
Research Officer
Hollings Faculty

APPENDIX 2: Survey questionnaire (paper-based)

Dear respondent,

PAGE 1

I am doing an academic research entitled:

AQL-Based Sampling for the Garment Inspection in the Malaysian Garment Manufacturers: A Quality Assurance Framework

You are invited to participate in the research study being conducted by Ms Nor Juliana Mohd Yusof from Manchester Metropolitan University, United Kingdom. The purposes of this study are; i) to determine the level of implementation of quality management system and quality programmes utilised by the Malaysian garment manufacturers regardless the size of companies and production system, ii) to understand the application of quality control activities, the method of inspection and sampling plan used for inspection in the stage of production and finishing of mass-produced garments.
As the quality practitioners, your feedbacks are very valuable for this project. You are requested to complete this survey that will take approximately 15 minutes to complete. All survey responses will be treated confidentially and the results of this study will be used for scholarly purposes only. .

Participation in this research study is voluntary and you may refuse to participate at any time.

If you have any further questions or would like to receive information about this project, you may contact Nor Juliana Mohd Yusof (researcher) at +447474077799, nor-juliana.b.mohd-yusof@stu.mmu.ac.uk or Dr Steve Hayes (supervisor) +447825721134, S.G.Hayes@mmu.ac.uk at the Department of Apparel, Hollings Faculty, Manchester Metropolitan University, United Kingdom.

Thank you for your assistance in this important endeavor.

SECTION A: ORGANIZATIONAL PROFILE

Please select the appropriate answer that apply for your organization.

*Required

1) Number of years in operation*

- ○ Less than 10 years
- ○ 10 but less than 20 years
- ○ 20 but less than 30 years
- ○ 30 but less than 40 years
- ○ Over 40 years

2) How many employees does your company have? You can estimates the total number of employees in your company*

3) Location of production division/plants*

4) Company's main product*

5) The end products are supplied for*;

- ○ International market
- ○ Domestic markket
- ○ Both - International and Domestic

6) Category of company*

- ○ Micro enterprise - Companies with annual sales turnover not exceeding RM300,000 or with no more than five full time workers
- ○ Small-sized enterprise - Companies with annual sales turnover between RM300,000 and RM15 million or employing between 5 and 75 workers
- ○ Medium-Sized enterprise - Companies with annual sales turnover between RM15 million and RM50 million or employing between 75 - 200 workers
- ○ Large companies - Companies with more than 50 million annual turnover and engaging more than 200 workers.

APPENDIX 2: Survey questionnaire (paper-based)

7) Does your company have a full garment manufacturing process?* PAGE 2

- ○ Yes
- ○ No

8) How would you describe the sewing production system used to mass-produce finished garments in the factory?*

- ○ Progressive Bundle System - Production organized by keeping bundles of like components together. Each operator completes the same task on each garment in the bundle before passing it on to the next operator.
- ○ Modular Production (team-based manufacturing) - Technique that replaces the traditional assembly line; operators are grouped into teams, or modules.
- ○ Unit Production System (UPS) - System that replaces the traditional assembly line; garments are sent to each operator's station via computer-controlled overhead transports, improving flow of garments through the factory and eliminating the time spent in handling bundles.
- ○ Flexible Manufacturing - The ability of manufacture small quantities of an assortment of product styles within a short period.

9) Does your company appoints any sub-contractors for production of garments?

- ○ Yes
- ○ No

10) Please indicate what type of specialisation is offered by the sub-contractors?

- ○ Cutting
- ○ Sewing
- ○ Printing
- ○ Dyeing
- ○ Embroidery
- ○ Packaging
- ○ Other: ____

SECTION B: QUALITY MANAGEMENT SYSTEM AND PRACTICES IN THE MALAYSIAN GARMENT INDUSTRY

11) Do your company have the accredited quality system? Select all that apply

- ○ Yes, go to Q12
- ○ No, go to Q15

12) If Yes, how many years the quality system have been implemented?

- ○ 1 - 5 years
- ○ 6 - 10 years
- ○ 11 - 15 years
- ○ 16 - 20 years
- ○ More than 20 years

13) Which quality system below does your company have? Select all that apply

- ○ ISO 9001:2008
- ○ ISO 14000 Environmental Standard Management (EMS)
- ○ OEKO-TEX Standard 100
- ○ Occupational Safety and Health Management System (OSH)
- ○ Worldwide Responsible Apparel Production (WRAP)
- ○ Other: ____

14) 14. In your opinion, what was the main reason for the accreditation of the quality system? Select all that apply

- ○ Customer requirement
- ○ Improving management process
- ○ Marketing purpose
- ○ Tender purpose
- ○ Business survival
- ○ All of the above

APPENDIX 2: Survey questionnaire (paper-based)

15) Please state the departments within the company that are involved with the monitoring and implementation of quality in your company.

16) Please rate how often these quality improvement programmes and tools have been used in your organization?

	Never	Sometimes	Often	Very often
Total Quality Management (TQM)	○	○	○	○
Problem solving techniques	○	○	○	○
Quality Circle	○	○	○	○
7 QC tools (Eg; Ishikawa diagram, Pareto diagram, Checksheet, Flowchart	○	○	○	○
7 New QC tools (Eg; Matrix diagram, Relationship diagram, Tree diagram, Affinity Diagram)	○	○	○	○
Research & Development (R&D)	○	○	○	○
Internal Quality Audit	○	○	○	○
Staff Training	○	○	○	○
Final Inspection/Audit by Buyer QC (Export)	○	○	○	○
Supplier/Vendor Evaluation	○	○	○	○
ISO 9000 (ISO 9001, 9002, 9003, 9004)	○	○	○	○
5S	○	○	○	○
Six Sigma	○	○	○	○
Customer Satisfaction Survey	○	○	○	○
Statistical Process Control (SPC)	○	○	○	○

17) In your opinion, the implementation of quality system in your company has been;

- ○ Easy
- ○ Challenging
- ○ Difficult

SECTION C: QUALITY CONTROL AND INSPECTION PROCESS IN THE GARMENT INDUSTRY

18) Please select the types of inspection that were available in your factory for the purpose of monitoring the quality of garments. Select all that apply

- ○ Fabric/piece good inspection
- ○ Visual inspection during the spreading of material
- ○ Cut pieces check/bundles inspection
- ○ In-line inspecton during sewing
- ○ Final inspection by internal QC at finishing
- ○ Final audit by buyer QC before shipment
- ○ Other:

19) Who are responsible to conduct a quality inspection in the production (sewing department) and finishing before the end products delivered to customers? Select all that apply

- ○ In-line QC Inspector
- ○ End-line QC Inspector
- ○ QC Supervisor
- ○ Independent agent appointed by the retailer/buyer
- ○ Other:

APPENDIX 2: Survey questionnaire (paper-based)

20) Based on your experience, how often are these problems are found in the sewing floor?

	Not at all	Rarely	Sometimes	Most of the time
Fabric defects	○	○	○	○
Cutting defects	○	○	○	○
Sewing and seaming defects	○	○	○	○
Machine fault	○	○	○	○
Sewing operator fault	○	○	○	○
Measurement is out of tolerance	○	○	○	○

21) Please indicate how strongly you agree or disagree with the following statement concerning the method of inspection used in your company. Please remember, there is no right or wrong answers.

	Strongly disagree				Strongly agree
	1	**2**	**3**	**4**	**5**
Inspection process is extremely important in the garment industry	○	○	○	○	○
Inspection will prevent defective garments reach customers.	○	○	○	○	○
The procedures and the work flow of the quality inspection can be accessed easily.	○	○	○	○	○
Records of inspection are filed and kept within the retention period.	○	○	○	○	○
Skill and experiences of quality inspectors are the main factor of an effective inspection.	○	○	○	○	○
The appropriate sampling technique used for garment inspection is also the main factor of an effective inspection.	○	○	○	○	○
The inspector will check and inspect all parts of garments as according to the production and measurement specifications.	○	○	○	○	○
The inspector will randomly take few pieces of garment parts for inspection during production.	○	○	○	○	○
100% inspection is ineffective to be conducted during production and finishing, unless the acceptable quality level is not met.	○	○	○	○	○

22) Based on your experiences, the implementation of quality control activities and garment inspection in your company has been:

- ○ Easy
- ○ Challenging
- ○ Difficult

APPENDIX 2: Survey questionnaire (paper-based)

SECTION D: ACEPTABLE QUALITY LEVEL (AQL) FOR GARMENT INSPECTION

23) Do you refer to AQL for garment inspection?

- ○ Yes, go to Q24 - Q28
- ○ No, go to Q29 & 30

24) What is the AQL used for the following garment inspection?

	NA	<1.0	1.0	1.5	2.5	4.0	6.5
In-process inspection	○	○	○	○	○	○	○
Final inspection by internal QC	○	○	○	○	○	○	○
Final inspection by the buyer QC	○	○	○	○	○	○	○

25) What is the AQL used for the following defects?

	NA	<1.0	1.0	1.5	2.5	4.0	6.5
Critical Defects	○	○	○	○	○	○	○
Major Defects	○	○	○	○	○	○	○
Minor Defects	○	○	○	○	○	○	○

26) Which type of the statistical sampling plan have been used for garment inspection?

- ○ Single sampling plan
- ○ Double sampling plan

27) Please indicate how strongly you agree or disagree with the following statement concerning the AQL-based inspection in your company. Please remember, there is no right or wrong answers.

	Strongly disagree 1	2	3	4	Strongly agree 5
AQL-based sampling is the effective method of sampling for garment inspection.	○	○	○	○	○
AQL-based sampling helps QC inspector/auditor to determine and decide at what quantities of garment parts and complete garments to be accepted or rejected.	○	○	○	○	○
Inspectors were understand how to read and use the AQL table for garment inspection.	○	○	○	○	○
Everyone in the quality department understand the concept of AQL	○	○	○	○	○
The decision made on the quality of the entire lot is accurate by using the AQL-based sampling.	○	○	○	○	○
The buyer and manufacturer (supplier) should agree on AQLs	○	○	○	○	○

APPENDIX 2: Survey questionnaire (paper-based)

	Strongly disagree 1	2	3	4	Strongly agree 5
The quality of the garment parts and complete garments are guaranteed after went through an inspection using AQL-based sampling	○	○	○	○	○

28) Based on your experiences, the use of AQL-based sampling for garment inspection in your company has been;

- ○ Easy
- ○ Challenging
- ○ Difficult

29) If you are not using the AQL-based sampling, please indicate how would you determine the quantities of garment for inspection at sewing and finishing department? Select all that apply

- ○ Based on the company's quality standard and procedures
- ○ Based on the customer's requirement and specification
- ○ Fixed percentage - always 10% from the entire lot
- ○ Whatever percentage deemed appropriate
- ○ Other: _____

30) Please state the major reason of not using AQL-based sampling for inspection.

_____

SECTION E: INDIVIDUAL PROFILE

31) What is your current job position?

- ○ Supervisor/Assistant Supervisor
- ○ Executive/Assistant Executive
- ○ Head of Department
- ○ Assistant Manager
- ○ Manager
- ○ Other: _____

32) How many years have you been with the company?

- ○ Less than 5 years
- ○ 5 but less than 10 years
- ○ 10 but less than 15 years
- ○ 15 but less than 20 years
- ○ Over 20 years

End

APPENDIX 3: Summary of feedback from pre-testing

PRETESTING THE QUESTIONNAIRE					
No.	**Name**	**Organization**	**Job Position**	**Comment/Feedback**	**Action taken**
1.	Mrs Wan Rakiah Wan Abdullah	My-Sutera Sdn Bhd PT4256, Kawasan Perindustri Pengkalan Chepa II 16100 Kota Bharu Kelantan, Malaysia	**Head of Quality Control**	- The language, wordings, questions and technical terms used are easy to understand. The instruction is clear. - **Suggestion:** i) reduce questions ii) translate to Malay Language	- This online survey will includes participant who may have limited English skills. Therefore, the consideration to translate this survey into Malay language is compulsory. - Some of questions were removed. (Please refer to hard copy dated 3/6/14 - The revision of questions was done after got feedback from Mrs Wan
2.	Ms Rica	Whitex Garments Sdn Bhd 50, Jalan Taming 2 Taman Taming Jaya 43300 Seri Kembangan Selangor, Malaysia	**Head of Quality Control**	- The language, wordings, questions and technical terms used are easy to understand. The instruction is clear. The person in-charge of QAQC definitely will understand the questions. - No suggestion	- No correction made
3.	Mr Mohamed Zalman	Penfabric Sdn Bhd Plot 117 - 119 & 200-202, Prai Free Industrial Zone I, 13600 Prai, Penang, Malaysia	**Quality Manager**	- The language, wordings, questions and technical terms used are easy to understand. The instruction is clear. - **Suggestion:** i) Question No. 6: Category of Malaysian SMEs - should add large companies ii) Question No. 8: Sewing production system - Flexible manufacturing (the term is simple - people might confuse) iii) No need to add company's name	- Question No. 6: add response option - large companies - Question No. 8: maintained - flexible manufacturing
4.	Dr Norsaadah Zakaria	Raffles Design Institute Riyadh, Saudi Arabia	**Academic Director Consultant**	- Overall is good. - No suggestion	- No correction made
5.	Mr Mohd Hafeez	Pakaian Saling Erti No 15-1 Jalan Jelatek 2 Pusat Perniagaan Jelatek 54200 Kuala Lumpur	**Quality Manager**	- The language, wordings, questions and technical terms used are easy to understand. The instruction is clear. - No suggestion	- No correction made
Additional Info:					
The pretesting also has been conducted to some of participants who are not involved as the target population. Their involvement in this process was purposely to identify the simplicity of the language and words used in the questions, instruction is clear, the ordering of questions for each section (A - E) and also the layout/theme of the online form. Five participants/testers were involved at this stage.					
Based on their feedback, the online survey can be accessed easily by clicking to the link provided via e-mail, and no other problems have been reported regarding the accessibility of the online survey					

APPENDIX 4: Letter of permission to conduct case study research

Hollings Faculty

Department of Apparel

Manchester Metropolitan University

Nor Juliana Mohd Yusof
Manchester Metropolitan University
Hollings Faculty - Apparel
Righton Building, Cavendish Street
Manchester M15 6BG
England, UK.

04 June 2015

Ms Penny Lee
Managing Director
Whitex Garments Sdn Bhd
50/52 Jalan Taming Dua
Taman Tanming Jaya off Jalan Balakong
43300 Selangor

Righton Building
Cavendish Street
Manchester
M15 6BG
United kingdom

Telephone
+44 (0)161 247 2645
Web
www.hollings.mmu.ac.uk
E-mail
a.welsh@mmu.ac.uk

Alison Welsh
Head of Department

Dear Ms Penny,

RE: **Permission to Conduct Research Study**

My name is Nor Juliana Mohd Yusof. I am currently pursuing Doctoral studies at Manchester Metropolitan University, UK in the Department of Apparel. I am writing to request permission to conduct a case study in Whitex Garments Sdn. Bhd. The research I wish to conduct involves in-depth investigation of the inspection systems developed in the Malaysian garment manufacturing sector for *ready-to-wear* garments for both domestic and international markets. The research aims to better understand how quality management is being utilised in the garment manufacturing industry in the aspect of quality control and assurance (QAQC) for mass-produced garments. This project will be conducted under the supervision of Dr Steve Hayes, Dr Tasneem Sabir and Dr John McLoughlin.

The methodological approaches that will be used for data collection are: semi-structured interviews, observations and reviewing required documents for the validation purpose. It will take two days only. The data collected will provide useful information regarding the development of a novel quality assurance framework for the Malaysian garment industry. I would welcome the opportunity to discuss this with you by phone if that would be helpful. In addition, I would be happy to provide any other information you may require in order to make a decision. All information obtained from this study will be used for scholarly purposes only. The data will be stored securely and only those directly involved with the research will have access to it.

Your approval to conduct this study will be greatly appreciated. If the approval is granted, kindly return the signed reply form enclosed to this letter.

Thank you for your time and consideration in this matter.

Yours sincerely,

.....
Nor Juliana (017-6395201)

APPENDIX 5: Reply form

REPLY FORM

Nor Juliana Mohd Yusof
Postgraduate Researcher
Manchester Metropolitan University
Hollings Faculty - Apparel
Righton Building, Cavendish Street
Manchester M15 6BG
England, UK.

Mobile: +447474077799
E-mail: 13160441@stu.mmu.ac.uk

Re: Permission to Conduct Research

We have reviewed your request to conduct a research project in our company. We understand that the project is designed to gather information about the quality approaches and inspection systems used in the Malaysian garment manufacturing industry. The decision is as follows:

☐ The request is approved on the understanding that the researcher is ready to comply with the company's requirements, rules and regulations.

☐ The request is not approved.

Company Name	
Company Address	
Contact Person	
Telephone	
Fax	
E-mail	

_____ **Date:** _____

Company Stamp / Signature

Note : *Reply form that has been filled could be sent to the researcher's e-mail address.*

APPENDIX 5: Reply form (feedback)

REPLY FORM

Nor Juliana Mohd Yusof
Postgraduate Researcher
Manchester Metropolitan University
Hollings Faculty - Apparel
Righton Building, Cavendish Street
Manchester M15 6BG
England, UK.

Mobile: +447474077799
E-mail: 13160441@stu.mmu.ac.uk

Re: Permission to Conduct Research

We have reviewed your request to conduct a research project in our company. We understand that the project is designed to gather information about the quality approaches and inspection systems used in the Malaysian garment manufacturing industry. The decision is as follows:

☑ The request is approved on the understanding that the researcher is ready to comply with the company's requirements, rules and regulations.

☐ The request is not approved.

Company Name	BALQIS TEXTILES AND MANUFACTURING SDN BHD (967188-M)
Company Address	No 13 Jalan KPK 1/5, Kawasan Perindustrian Kundang, Kundang Jaya, 48020 Rawang, Selangor. Tel: 03-60344707 Fax: 03-60344706
Contact Person	Pn. WAJIDAH AZHARA BINTI MOHAMED YUSOFF
Telephone	016 - 616 3609
Fax	03 - 6034 4706
E-mail	wajidah.bfm@gmail.com

Company Stamp / Signature

Date: 1.6.2015

Note : *Reply form that has been filled could be sent to the researcher's e-mail address.*

AZLINA BINTI HAMID
EXECUTIVE DIRECTOR
1/6/2015

APPENDIX 6: Plan of visit of case study

Plan of visit (Day 1 & Day 2)					
May - July 2015					
Day	ACTIVITIES	Checklist		Person in-charge	Document to review (if available)
		AQL	Non-AQL's		
Day 1 09.30am - 12.15pm	**Briefing Session**			Human Resource Personnel/ Company's Representative	Company's booklet, Quality manual, Procedures, Process Flow Charts
	Brief presentation about the background of the company, which including:	✓	✓		
	- Its end products and services	✓	✓		
	- Company's organisational chart	✓	✓		
	- Quality management system (QMS) adopted	✓			
	- Quality system certification	✓			
	- Management system adopted		✓		
	- Process flow in manufacturing	✓	✓		
	- Factory visit	✓	✓		
Day 1 14.00pm - 16.30pm	**Interview and Observation I**			Head of Quality/Quality Assurance or Quality Control Manager/ QC Executive/ QC Supervisor	Procedures, Process Flow Charts, Inspection report, Inspection records, AQL table
	- Quality Assurance/control department	✓	✓		
	- Procedures and flow of process	✓	✓		
	- People - who involve? / organisation chart in QC	✓	✓		
	- Standard used /any customer requirement?	✓	✓		
	- Activity in QC / Training?	✓	✓		
	- Types of inspection in QC (Top & middle level management)	✓	✓		
	- Method of inspection	✓	✓		
	- AQL used	✓			
	- Sampling technique used for inspection	✓	✓		
	- Defects classification	✓	✓		
	- Constraint and problem associated with quality	✓	✓		
	(human, cultural, technological, environment, etc.)				
	- Customer complaint	✓	✓		
	- Corrective and preventative action	✓	✓		
	- Records/Form available	✓	✓		
	- Other quality improvement activities	✓	✓		
Day 2 09.30am - 12.15pm	**Interview and Observation II / Photography images**			QC Inspectors, In-line QC	Production Specification Sheet, Measurement Spec Sheet, Inspection records, AQL table and any other forms
	- Routine task and responsibility	✓	✓		
	- Defects classification (Low level management)	✓	✓		
	- Problem in production and inspection	✓	✓		
	- AQL-based sampling - 5W 1H	✓			
	- AQL specified by customer - how it is achieved?	✓			
	- Sampling technique used for inspection		✓		
	- Constraint and problem associated with the inspection	✓	✓		
	process	✓	✓		
Day 2 14.00pm - 16.45pm	**Document review (if the documents are available)**			Process owner	All required documents as above
	- Quality standard and procedures	✓	✓		
	- Process Flow Chart	✓	✓		
	- Inspection records	✓	✓		
	- Audit / Inspection report	✓	✓		
	- Other related documents	✓	✓		
	- Other issues	✓	✓		
17.00pm	**End of visit**				

APPENDIX 7: Sample of case study questionnaire

Case Study Research in the implementation of Quality Control Approaches used in the Malaysian Garment Industry

SEMI STRUCTURED INTERVIEW QUESTIONS

Theme	Interview Questions	Answer from participant
Quality Assurance (QA)	1) Could you please explain your roles and responsibility in the company? Who will be responsible for quality?	
	2) Explain briefly the flow of garment manufacturing in this company?	
	3) How did the company monitor and control the garment's quality from the stage of receiving raw materials until packaging? **OR** How many inspection has been conducted before the end products are delivered to the customer?	
	4) Why inspection was considered the most important and useful quality management (QM) approach in this industry? Why manufacturers did not used the advanced quality programmes?	
	5) How the implementation of QMS help the company to produce high quality garments to customers? (meet and exceed customer expectation) - ***Good impact, gradual improvement or nothing change?***	
	6) Why the implementation of QMS was considered challenging in this industry? Any critical issues?	
	7) How about the use documentation and records?	
Quality Control (QC)	8) Explain briefly about QC department in this company.	
	9) How inspection is conducted in sewing and finishing?	
	10) What is the quality standard and specification used to conduct the inspection?	
	11) What is the common problem in clothing production?	
	12) Is there any problem faced by QC inspector?	
	13) How frequent training is provided to the staff in QC department including inspectors?	
	14) Any other quality intiatives used to improve quality?	

Theme	Interview Questions	Answer from participant
Quality Control (QC)	15) Could you please list or show me the procedures (SOP) or quality records/forms/check sheet used for QC?	
	16) Is there any key performance indicator (KPI) or target to be achieved in production and QC?	
	17) How customer complaint is handled?	
Sampling for Garment Inspection	18) Why AQL-based sampling or company's inspection procedures are used for garment inspection?	
	19) Who will set and determine the AQL standard to be used in the company?	
	20) Do the company use different AQL standard for different type of defects?	
	21a) AQL-based sampling - How often cases associated with *producer's & consumer's risk* occur?	
	21b) Non-AQL - How manufacturer ensure the inspection result is reliable?	
All	22) What is your routine task and working hours?	
	23) Have you undergo any training?	
	24) Do you used any forms to record any data for inspection?	
	25) What are the common defects you found in the sewing assembly line?	
	26) Is there any problem in the inspection process?	
	27) How frequent the major defects were found during final inspection? Can you differentiate AQL 2.5 and 4.0?	

APPENDIX 8: Consent form

Manchester Metropolitan University

Nor Juliana Mohd Yusof
Postgraduate Researcher
Hollings Faculty – Apparel
Manchester Metropolitan University

Mobile: +447474077799
E-mail: 13160441@stu.mmu.ac.uk

CONSENT FORM (INTERVIEWS)

I volunteer to participate in a research project entitled "**AQL-Based Sampling for Garment Inspection in Malaysian Garment Manufacturing: A Quality Assurance Framework**" conducted by Nor Juliana Mohd Yusof from Manchester Metropolitan University. I understand that the project is designed to gather information about the quality approaches and inspection systems used in the Malaysian garment manufacturing industry.

1. I understand that my participation is voluntary and I will not be paid for my participation. I may withdraw and discontinue participation at any time without penalty.
2. I understand that I will be interviewed and the session will last approximately 30-40 minutes. Notes will be written during the interview.
3. I agree to the interview/focus group being audio recorded.
4. I understand that any information given by me may be used and presented in the thesis, articles or presentations by the research team.
5. I understand that any data or information used in any publications which arise from this study will be anonymous and my confidentiality as a participant in this study will remain secure.
6. I understand that all data will be stored securely and only those directly involved with the research will have access to them.
7. I understand that all data will be retained for a further six months once completion of the thesis and then destroyed.
8. I understand that I may contact the researcher if I require further information about the research.
9. I have read and understand the explanation provided to me. I have had all my questions answered to my satisfaction, and I voluntarily agree to participate in this study.
10. I have been given a copy of this consent form.

Participant:

Name of Participant	Signature	Date

Researcher:

Nor Juliana Mohd Yusof

Name of Researcher	Signature	Date

APPENDIX 8: Consent form from participant

Manchester Metropolitan University

Nor Juliana Mohd Yusof
Postgraduate Researcher
Hollings Faculty – Apparel
Manchester Metropolitan University

Mobile: +447474077799
E-mail: 13160441@stu.mmu.ac.uk

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1. I understand that my participation is voluntary and I will not be paid for my participation. I may withdraw and discontinue participation at any time without penalty.
2. I understand that I will be interviewed and the session will last approximately 30-40 minutes. Notes will be written during the interview.
3. I agree to the interview/focus group being audio recorded.
4. I understand that any information given by me may be used and presented in the thesis, articles or presentations by the research team.
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8. I understand that I may contact the researcher if I require further information about the research.
9. I have read and understand the explanation provided to me. I have had all my questions answered to my satisfaction, and I voluntarily agree to participate in this study.
10. I have been given a copy of this consent form.

Participant:

ABDUL AZIZ BIN MAT NOOR — Name of Participant

Signature

Abdul Aziz Bin Mat Noor
Head of Admin & Hr Dept
Syarikat Jasa A.S. Sdn. Bhd.
(158295-K)

20/05/2015 — Date

Researcher:

Nor Juliana Mohd Yusof — Name of Researcher

Signature

20/5/2015 — Date

APPENDIX 9: Observational protocol

Nor Juliana
Hollings Faculty - Apparel, MMU

Fieldwork 2015

Title: AQL-based sampling for garment inspection - A Quality Assurance Framework

Case Study Research in the implementation of Quality Control Approaches used in the Malaysian Garment Industry

OBSERVATION CHECK LIST

Company		**AQL-based sampling**		**Non AQL**	
INSPECTION PROCESS		**Note**			
Quality Check Points (methods)					
Sewing Department Inline inspection Roaming inspection End of line inspection or table checking Others, if any: (i) _____ (ii) _____					
Finishing Department Final finishing inspection - before tagging and labelling Internal final audit - before shipping / send to customers. 'Others, if any: (i) _____ (ii) _____					
Inspectors/Quality controllers (Man)					
Gender : M / F Nationality: Local / Foreign workers Language : Malay / English / Others Working position: Sitting / standing					
Working condition (Environment)					
Space : Adequate / cramped Lighting : Good / satisfactory / not good Level of noise: Low / medium / high Working hours: _____					
Technology used (Machine)					
Inspection aids (Material)					
Standard of Procedures: Yes / No Inspection forms: Yes / No Customer Spec: Yes / No Master Sample: Yes / No Measurement tape: Yes / No					